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Evaluation of Esophageal Dysphagia in Elderly Patients

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Abstract

Purpose of Review—While guidelines exist for the evaluation and management of esophageal dysphagia in the general population, dysphagia disproportionately affects the elderly. In this article, we reviewed the literature on evaluating esophageal dysphagia in elderly patients and proposed a diagnostic algorithm based on this evidence.

Recent Findings—In older patients, dysphagia is often well compensated for by altered eating habits and physiologic changes, underreported by patients, and missed by healthcare providers. Once identified, dysphagia should be differentiated into oropharyngeal and esophageal dysphagia to guide diagnostic workup. For esophageal dysphagia, this review proposes starting with endoscopy with biopsies, given its relative safety even in older patients and potential for interventional therapy. If endoscopy shows a structural or mechanical cause, then further cross-sectional imaging should be considered to assess for extrinsic compression, and same session endoscopic dilation should be considered for strictures. If biopsies and endoscopy are normal, then esophageal dysmotility is more likely, and high-resolution manometry and additional workup should be performed following the updated Chicago Classification. Even after diagnosis of the root cause, complications including malnutrition and aspiration pneumonia should also be assessed and monitored, as they both result from and can further contribute to dysphagia.

Summary—The successful evaluation of esophageal dysphagia in elderly patients requires a thorough, standardized approach to collecting a history, selection of appropriate diagnostic workup, and assessment of risk of potential complications, including malnutrition and aspiration.

Keywords

Geriatrics; Presbyphagia; Esophagogastroduodenoscopy; Barium esophagram; Balloon dilation; Achalasia

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Introduction

Dysphagia, broadly characterized as difficulty or trouble swallowing, is a prevalent and common symptom encountered in clinical practice, reported in approximately 1 in 6 adults [1]. Dysphagia can be classified based on anatomic location, which is important to guide clinical workup and management. Oropharyngeal dysphagia refers to difficulty initiating a swallow by forming and moving a food bolus from the mouth to the pharynx and esophagus, whereas esophageal dysphagia refers to the sensation of food or liquid “getting caught” due to pathology within the esophagus [2]. While guidelines exist for the evaluation and management of esophageal dysphagia in the general population [3–5, 6••, 7••], dysphagia is a condition that disproportionately affects the elderly [1, 8–12]. Dysphagia in older patients tends to have different etiologies than in younger age patients [13]. During evaluation, the impact of co-morbidities, frailty [14], malnutrition [15], age [16], and risk of complications of dysphagia such as aspiration pneumonia [17] should be taken into account. In this review, we summarize the current literature on and propose an approach for the evaluation of esophageal dysphagia in the elderly.

Epidemiology and Economic Burden of Dysphagia in the Elderly

The prevalence of dysphagia is difficult to define because many studies use different definitions and screening tools. The word dysphagia is derived from Greek terminology for disordered eating and is broadly defined as difficulty swallowing [18]. Since there is no standardized definition or screening tool for dysphagia, epidemiologic studies utilize variable definitions including screening questions such as “having the feeling that food gets stuck in your throat or chest, or coughing or choking with swallowing?” [8] or the number of swallow referrals [19]. This variability in the literature results in wide ranges of reported prevalence of dysphagia. Furthermore, dysphagia is likely significantly underreported, with around 50% of patients not reporting their symptoms to their physicians [1, 8, 20].

Beyond these challenges, patients above 60 years old are a heterogeneous population. For example, acuity of care can range from healthy, community-dwelling patients, to those with skilled needs living at nursing homes, to those in the intensive care unit with multiple neurocognitive deficits. One of the more commonly studied elderly populations are nursing home residents, in which about 52.7–55% are found to have some degree of dysphagia [11, 21]. Although the prevalence of dysphagia in community dwelling elderly is much lower around 15% according to a systematic review by Madhavan et al., these patients could be a source of missed diagnoses given less frequent clinical surveillance [22]. In hospitalized patients, signs of dysphagia were found in 30.7%–43.1% of patients and found that nursing staff often missed diagnoses without use of the screening tool [23, 24]. In critically ill patients, studies have shown postextubation dysphagia to be anywhere from 3 to 93% [25].

Not only is dysphagia common in the elderly population, but its prevalence may also be increasing over time. One study by Leder et al. showed that referrals for swallowing evaluations in patients older than 60 years increased by 64% from 2007 to 2014, despite only a 23% increase in inpatient discharges in the same population [19]. There are multiple possible explanations for this increased prevalence including general aging of people in the

world [26] and increased awareness of the implications of dysphagia in the medical field [19].

Dysphagia is also associated with increased costs to the healthcare system and use of hospital resources. A study in 2018 by Patel et al. found hospitalized patients with dysphagia compared to those without dysphagia to have 33% higher total charges and longer lengths of stay by approximately 3.8 additional days [10]. The combination of the high and increasing prevalence of dysphagia with its burden on the healthcare system highlights the importance of diagnosing and evaluating patients for dysphagia to guide management.

Clinical Presentation

Symptoms—Symptoms can be helpful in determining the cause of dysphagia and in creating a differential diagnosis. For esophageal dysphagia, a majority of cases can be categorized into structural disorders and esophageal dysmotility. The traditional teaching was that dysphagia to only solids suggested a structural etiology whereas dysphagia to both solids and liquids suggested motility disorders. History can also point to specific disorders, such as a history of atopic conditions suggesting a differential of eosinophilic esophagitis (EoE) [27, 28].

Not all presentations reliably correlate to a differential diagnosis though. For example, weight loss is commonly associated with esophageal cancer because up to 78.9% of patients are found to be malnourished [29]. However, weight loss is found in multiple other etiologies of dysphagia such as achalasia [30], which makes it difficult to separate weight loss due to difficulty swallowing and poor nutrition versus sarcopenia secondary to malignancy.

Clinical Assessment Tools—Given the variability in consistent definitions for dysphagia, clinical assessment tools were created to standardize diagnosis and symptom tracking over time (Table 1). To assess esophageal dysphagia in general, the Brief Esophageal Dysphagia Questionnaire (BEDQ), Mayo Dysphagia Questionnaire (MDQ), and Eating Assessment Tool (EAT-10) have been validated [31–35]. The problem is that dysphagia can be caused by a variety of etiologies. These various etiologies can present differently, which is why specific assessment tools have been created for specific disease etiologies and general assessment tools had to be validated for each condition. For achalasia, the Eckardt score can be used to track disease progression and improvement after intervention, but is still recommended to be used in conjunction with objective diagnostic studies such as manometry [3, 4, 30]. For EoE, the Eosinophilic Esophagitis Activity Index (EEsAI) [36] used to be one of the only patient-reported outcome (PRO) based assessment tool that was specifically made for EoE, but other general tools have been validated for EoE as well, including the BEDQ, MDQ, Straumann Dysphagia Index, and Dysphagia Symptom Questionnaire [37]. Because the EEsAI has been found to only have sensitivity of endoscopic and histologic remission in up to 67.7% depending on score cutoff [38], more diagnostic PRO tools have been in development in recent years, including the Index of Severity for Eosinophilic Esophagitis (I-SEE) [39]. Despite dysphagia affecting about 4 out of 5 patients with Parkinson's disease, it is often underreported by these patients

[20, 40]. For this reason, multiple questionnaires have been validated with the goal of earlier detection of dysphagia in patients with Parkinson's disease, including the Swallowing Disturbance Questionnaire (SDQ), Munich Dysphagia Test – Parkinson's Disease (MDT-PD), and DYPARK questionnaire [41–43].

Differential Diagnoses

Presbyphagia versus Dysphagia—As patients age, they naturally develop changes in their swallowing mechanics [44]. Presbyphagia describes these physiologic changes with age, but without impairment in swallowing [44, 45]. This must be distinguished from overt dysphagia, in which patients experience symptoms and consequences of dysfunctional swallowing [45]. Presbyphagia is thought to predispose the elderly to developing dysphagia in the future, and could potentially be a continuum of disease [45–47]. The issue is the clinical overlap between presbyphagia and dysphagia. At the beginning stages of the development of presbyphagia, patients may not have symptoms, but can develop symptoms as their physiology transitions to dysphagia [46].

While swallowing is a complex orchestration of multiple processes from neuronal pathways to muscular coordination, studies have suggested these mechanisms may change during the development of presbyphagia. For example, in the central nervous system, Labeit et al., through magnetoencephalography, identified increased sensorimotor cortical activation in patients with presbyphagia [47]. Videofluoroscopic swallowing studies combined with manometric data in patients with presbyphagia show increased oral transit time, post-swallow aspiration and duration of pharyngeal swallow delay, as well as decreased duration of pharyngeal swallow response, duration of cricopharyngeal opening, peristaltic amplitude, and peristaltic velocity [48, 49]. Modified barium swallow studies in healthy older individuals showed worse composite scores for oral and pharyngeal swallowing function, with the worst scores in function of: tongue control during bolus hold, hyolaryngeal movement, laryngeal closure, pharyngeal contraction, and pharyngoesophageal segment opening [44]. Studies on tongue mechanics have found that older patients have weaker maximal tongue strength as well as lower anterior and posterior tongue pressures while swallowing [50, 51]. Using M-mode ultrasound, Nienstedt et al. studied tongue movement and found less vertical lingual movement and shorter time to reach maximum amplitude in older women compared to younger women [52]. Despite the identification of multiple physiologic changes in presbyphagia, these patients often do not have symptoms, perhaps because they develop compensatory mechanisms.

Oropharyngeal versus Esophageal Dysphagia—Because oropharyngeal and esophageal dysphagia can present similarly, it can be difficult to differentiate them to guide appropriate workup and specialty referrals. Unfortunately, patient localization of symptoms does not reliably correlate to location of pathology. For example, in a review of 100 patients, localization of their symptoms to the proximal or mid-esophageal regions were rarely correlated to a proximal etiology [53]. However, in the same study, distal localization of dysphagia correlated to a distal esophageal etiology in 80% of cases. In a retrospective study on 3,668 patients with dysphagia, only 48% of them were able to correctly identify the location of pathology as pharyngeal, midsternal, or lower sternal

with pharyngeal pathologies being the most accurately identified [54]. This inaccuracy was also tested by Smith et al. by having patients with lower esophageal mucosal rings swallow a marshmallow bolus and report the location of their symptoms. Of the 16 patients, 12 (75%) of them reported symptoms in their upper neck [55]. Only 9% of patients with esophageal dysmotility on manometry reported diffuse symptoms [53]. Thus, it is recommended to tailor the history to ask other questions to differentiate oropharyngeal and esophageal dysphagia (Table 2) [56–58]. Though this review focuses on esophageal dysphagia from a gastroenterological perspective, it is important to consider that not all etiologies of oropharyngeal dysphagia need to be definitively managed by otolaryngology. Some common causes including Zenker’s diverticulum and cricopharyngeal bar have newer treatment modalities that can be performed by a gastroenterologist, such as Zenker’s peroral endoscopic myotomy (z-POEM) for the former and endoscopic dilation or cricopharyngeal peroral endoscopy myotomy (c-POEM) for the latter [59–62].

A Broad Differential Diagnosis of Esophageal Dysphagia—Esophageal dysphagia can be caused by a variety of conditions that can be categorized into structural/mechanical etiologies, esophageal dysmotility, or disordered brain-gut interaction. Structural/mechanical causes include malignancy, stricture, and inflammatory conditions such as esophagitis or EoE. Neuromuscular etiologies involve disruption of esophageal peristalsis, such as achalasia or ineffective esophageal motility (Table 3). Disordered brain-gut interactions include a wide-breadth of functional gastrointestinal disorders, one of which is functional dysphagia [63]. Rome IV criteria define functional dysphagia by four main criteria for the prior 3 months: symptoms of dysphagia at least once a week for more than 6 months, absence of esophageal mucosal or structural abnormality, absence of GERD or EoE, and absence of esophageal motility disorders [64]. When evaluating patients of any age with dysphagia, it is important to consider all causes. However, different age groups are disproportionately affected by different etiologies [13]. In particular, neurologic and oncologic etiologies more often affect those > 60 years old [13].

Mechanical/Structural Etiologies of Esophageal Dysphagia in the Elderly

Esophageal Stricture—Among patients undergoing upper endoscopy for dysphagia, the most common finding was esophageal stricture, found in 40.8% of patients [65]. Esophageal stricture becomes even more common with increased age [66]. Given its prevalence in elderly populations with dysphagia and the possibility of immediate endoscopic intervention on diagnosis, differential diagnoses should always consider stricture. However, esophageal stricture itself can be caused by multiple etiologies. Inflammatory causes include multiple forms of esophagitis including reflux, infectious etiologies, EoE as well as inflammatory conditions including pemphigoid and Crohn’s disease [67–69]. Iatrogenic causes include radiation, prior esophageal interventions and surgeries, and prolonged intubation [69]. Importantly, malignant etiologies need to be ruled out as goals of care, risks of palliative stenting, and multiple other options including resection, chemotherapy, and radiation may need to be discussed before endoscopic intervention [70].

Pill-Induced Esophagitis—The prevalence of polypharmacy in the elderly is reported as high as 96.5% in elderly hospitalized patients [71]. This makes elderly patients a high

risk population for pill-induced esophagitis as risk factors include older age, decreased esophageal peristalsis, and larger pills [72]. Pill-induced esophagitis typically presents with chest pain, odynophagia, or dysphagia [73]. While some patients will experience sudden onset of self-limiting retrosternal pain after taking medications, some can present with gradually progressive dysphagia due to the pill lodging in the esophageal mucosa and slowly causing mucosal injury [74]. The latter subset of patients may not associate their symptoms to their medications, which necessitates a careful history and keeping pill esophagitis as a differential diagnosis, even with atypical presentations.

Esophageal Cancer—Dysphagia can be one of the presenting signs of esophageal cancer and should be considered particularly in the elderly population. In the US, esophageal adenocarcinoma (EAC) is one of the fastest growing epithelial malignancies with a sevenfold increase in incidence from 1973 to 2017 [75]. As of 2021, esophageal cancer has an incidence of 4.6 per 100,000, death rate of 3.8 per 100,000, and a 5-year survival 20.6% [76]. Among malignancies, esophageal cancer is also associated with the highest risk of malnutrition [29]. Since EAC has a known precursor, Barrett’s esophagus (BE), that can be treated, the early evaluation, appropriate screening, and endoscopy of patients is crucial [77]. ACG 2022 guidelines recommend screening for BE in those with chronic gastroesophageal reflux disease (GERD) and two or more risk factors (male sex, age above 50 years old, white race, tobacco use, obesity, and family history of EAC or BE in a first degree relative) [77]. Notably, among the elderly population, about half are male in sex, and a significant number of these patients likely have at least one of the other risk factors.

Acute Esophageal Necrosis—Acute esophageal necrosis (AEN) is an acute syndrome characterized by circumferential blackened mucosa of the distal esophagus that classically abruptly transitions to normal mucosa at the GE junction [78]. Some gastroenterologists propose a two-hit hypothesis for the development of AEN [79]. The first hit involves patients having chronic risk factors such as cardiovascular co-morbidities, cirrhosis, malnutrition, and malignancy that confer susceptibility to esophageal ischemia or excess gastric acid in the esophagus, and the second hit is an acute event that triggers AEN through even worse ischemia or gastric acid buildup [79, 80]. AEN typically presents as an upper gastrointestinal (GI) bleed, but atypical presentations can present with dysphagia alone [78, 81]. Given the high rate of perforation at 5% and mortality at 32–38% [80–82], AEN must be diagnosed quickly with endoscopy showing characteristic blackened mucosa.

Etiologies of Esophageal Dysmotility in the Elderly

Sarcopenic Dysphagia—About a third of elderly patients with dysphagia can be associated with sarcopenia [83]. Though there is no consensus diagnostic criteria for sarcopenia, it is broadly defined as loss of strength and muscle mass [84]. Depending on the criteria used, prevalence of sarcopenia ranges between 10–27% in patients over 60 years old [84]. In a multivariable analysis including sarcopenia and sarcopenia-related conditions, by Maeda et al., sarcopenia independently predicted development of swallowing disorders [85]. “Sarcopenic dysphagia” refers to the loss of coordinated and sufficient deglutition secondary to sarcopenia of the swallowing muscles [86]. Due to the wide prevalence and association between sarcopenia and dysphagia [46], it is important to differentiate patients

with sarcopenic dysphagia from those with sarcopenia with dysphagia caused by other etiologies. Mori et al. proposed a potential diagnostic algorithm to make this distinction based on 5 factors including: presence of dysphagia, whole body sarcopenia, supporting imaging, exclusion of other causes of dysphagia, and sarcopenia being the primary cause [87].

Achalasia—A Medicare data analysis found the prevalence of achalasia in those older than 65 to be 162.1 in 100,000 and increasing with advanced age [16]. The same study estimated the national economic burden of achalasia to be 408 million dollars, with patients older than 65 accounting for about 151 million dollars [16]. Among patients with achalasia, it is recommended to identify subtypes of achalasia following the diagnostic algorithm proposed by the Chicago Classification in order to assess prognosis after treatment and direct therapeutic management [6•]. For example, type II achalasia shows the best response to botulinum toxin injection, pneumatic dilation (PD), and laparoscopic Heller myotomy (LHM) compared to other subtypes [88–90]. Whereas PD, peroral endoscopic myotomy (POEM), and LHM are comparable definitive therapies for type I and type II, POEM is first line for type III [4]. Type III also requires a longer myotomy with POEM than other subtypes [91].

Parkinson’s-related Esophageal Dysphagia—Especially in secondary etiologies of dysphagia, it is critical to identify the root cause in order to direct treatment. For Parkinson’s related esophageal dysphagia, consensus guidelines support the efficacy of optimizing the treatment of Parkinson’s disease itself as a first priority in preventing and improving dysphagia. For this reason, identifying Parkinson’s as the etiology becomes critical in management. For patients with Parkinson’s, validated questionnaires have been developed to diagnose dysphagia, such as the SDQ and MDT-PD [41, 42, 92]. On the other hand, for patients with dysphagia, it is often difficult to identify Parkinson’s disease in the early, premotor stage of disease given the lack of reliable diagnostic tools [93], even though esophageal manometry is abnormal in 40–60% of these patients [94].

Opioids—In the United States in 2019, about one in five adults had chronic pain and 12.3% of adults have had used opioids for pain in the prior 12 months [95]. Given this susceptible population especially among the elderly, identifying opioid-induced esophageal dysmotility (OIED) can alter the management of both pain and dysphagia. Both acute and chronic opioid use has been associated with esophageal dysmotility, including impaired lower esophageal sphincter (LES) relaxation and increased nonperistaltic contractions [96•, 97]. Among patients with OIED, diffuse esophageal spasm, esophagogastric junction outflow obstruction (EGJOO), jackhammer esophagus, and achalasia type III were the most common of the Chicago Classification diagnoses [98]. Given that increased doses of opioids are associated with higher likelihood of developing OIED, decreasing dosing could improve OIED [98].

Systemic Sclerosis—Around 50% of patients with systemic sclerosis experience dysphagia [99] and up to 90% have manometric abnormalities, typically slower or lower pressure peristalsis [100, 101]. When comparing limited and diffuse systemic sclerosis, the

diffuse subtype was found have increased risk of esophageal hypomotility compared to the limited subtype (85.5% vs. 64%, $p < 0.01$) [102]. Although systemic sclerosis can directly affect esophageal motility, most commonly resulting in ineffective esophageal motility and absent contractility [103], it is important to keep a broad differential and workup for dysphagia in the population. For example, patients with systemic sclerosis are treated with immunosuppressive medications that could place them at risk of infectious etiologies, such as cytomegalovirus or candidal esophagitis. Additionally, systemic sclerosis can also cause decreased LES pressure and chronic GERD [99], predisposing patients to reflux esophagitis, strictures, and esophageal cancer.

Diagnostic Testing

EGD—Currently, esophagogastroduodenoscopy (EGD) with biopsy while off proton pump inhibitor therapy for two weeks is first line in the evaluation of dysphagia as a diagnostic and potentially therapeutic intervention [3, 104]. Visualization of the esophagus plays a key role in ruling out structural etiologies of dysphagia, and biopsies allow the diagnosis of a wide variety of conditions including EAC and EoE (Fig. 1) [3]. Further, strictures should be assessed for potential dilation during the same session endoscopy. EGD has been shown to be more cost effective than barium swallow as an initial diagnostic test, especially considering most initial encounters for dysphagia are in primary care [105].

In elderly populations, endoscopy tends to have higher diagnostic yield. EGD can have relevant findings including ulcers or malignancies detected in 10–20% of elderly patients [106, 107] and change management in up to 50% of elderly patients [108]. EGD is also relatively safe in the older populations. While increased age is associated with more frequent hypotension and hypoxia, these changes are usually associated with sedation and tend to be transient [106, 109, 110]. In a large retrospective study, Jang et al. found no difference in 30-day complications between young and older patients [111]. Given its diagnostic and therapeutic value in addition to its relative safety, EGD is a valuable tool for evaluating dysphagia in elderly patients.

Esophageal Physiologic Testing—After being confirmed to have no obstructive etiology on EGD with normal biopsies, ACG guidelines recommend esophageal high-resolution manometry (HRM) as the gold standard for diagnosing esophageal dysmotility [3]. The Chicago classification version 4.0 provides a standardized procedure for HRM with positioning and provocative maneuvers as well as consideration for follow-up testing for patients with equivocal results for EGJOO [6]. These patients are recommended to undergo further diagnostic testing with a timed barium esophagram (TBE) or functional lumen imaging probe (FLIP) (Fig. 1).

Barium esophagram can be performed in a variety of ways. Although timed and untimed barium esophagram have not been directly compared, guidelines recommend a standardized, timed procedure [3]. Diagnostic metrics significantly improve when adding a barium tablet swallow to the study [112], but even with a tablet, sensitivity for esophageal dysmotility in general is about 69% with specificity at 58% [113]. FLIP is recommended in the Chicago classification under the same indication as TBE [6] and allows the visualization of multiple

properties not seen on HRM, including response to esophageal distension and nonocclusive esophageal contractions [114].

Other Imaging Modalities—Considering the low correlation between patient localization of symptoms and true location of dysmotility [53], it is important to consider and rule out oropharyngeal dysphagia. For this reason, in most patients with dysphagia, a modified barium swallow, which is a videofluoroscopic study performed with a speech therapist, is recommended as “usually appropriate” for initial workup of dysphagia not related to recent operation by American College of Radiology (ACR) guidelines [5]. However, this study only reaches down to the cervical esophagus and does not assess for etiologies of esophageal dysphagia.

Many patients with dysphagia have already had a computed tomography (CT) of chest and/or neck with or without intravenous (IV) contrast for various co-morbidities or related symptoms, such as chest pain. While CT may be able to identify advanced disease and especially metastases to the lung, it is not sensitive for identifying primary esophageal tumors or locoregional disease [115]. As such, in ACR guidelines it is designated as “usually not appropriate” for initial workup of dysphagia that is not associated with recent surgery [5]. Interestingly, a recent study by Sui et al. applied deep learning to non-contrast CT scans in order to significantly improve sensitivity and specificity for identifying esophageal cancer [116]. In the future, enhancements in artificial intelligence could potentially change diagnostic management.

Complications of Dysphagia

Malnutrition and Dehydration—Dysphagia is independently associated with mortality in nursing home residents, but dysphagia with weight loss is associated with an even higher risk of mortality [15]. Malnutrition and sarcopenia can cause dysphagia [47, 85, 87], but dysphagia can also cause malnutrition. Specifically, modified diets can result in decreased caloric intake and calories [117]. In a study by Wright et al., texture modified diet decreased caloric intake by almost 40% (3877 versus 6115 kJ, $p < 0.0001$) as well as finding a significantly greater caloric deficit in the modified diet group [117]. Dysphagia is also associated with dehydration because of restrictions on thin liquids to prevent aspiration [118]. Some have considered free water protocols to prevent dehydration and improve quality of life [119]. The most data exists to support the Frazier Free Water Protocol, which has low quality evidence supporting that no association with a higher risk of aspiration pneumonia if patients are carefully selected [120]. Due to the lack of quality evidence, more research and standardized protocols are needed before widespread implementation of a free water protocol [121•]. Both malnutrition and dehydration can be caused by dysphagia, but also potentially worsen dysphagia. This cyclical effect supports the importance of the evaluation and optimization of patients’ nutritional and hydration status when managing dysphagia.

Aspiration Pneumonia—In 2020, pneumonia was the 9th leading cause of death in the general population [122], but for nursing home residents specifically, pneumonia was the leading cause of death [17]. Aspiration is defined as the misdirection of oropharyngeal or

gastric contents into the larynx and lower respiratory tract [123]. Aspiration pneumonia occurs when those contents contain pathogens, which usually colonize the oropharynx or stomach and cause pneumonia [17]. Pneumonia, aspiration, and dysphagia are all closely tied. In nursing homes about 50–75% of residents have dysphagia, half of those aspirate, and one third of those who aspirate develop pneumonia [124]. A study by Feng et al. found dysphagia patients were 4.69 times more likely to develop aspiration pneumonia [125]. In stroke patients who aspirate, pneumonia developed 7 times more often than in stroke patients without aspiration [17].

Multiple interventions have been suggested to prevent aspiration pneumonia. For example, Hinchey et al. recommends the use of a formal dysphagia screening protocol, which was associated with statistically significant increased adherence to screening at 78% compared to 57% without the protocol and decreased risk of pneumonia to 2.4% compared to 5.4% [126]. A systematic review by Khadka et al. found multiple studies showing that weekly professional oral care also reduced the risk of aspiration pneumonia [127•].

A review by Ebihara et al. hypothesized that the presence of chronic lung inflammation in elderly individuals could be due to sterile chronic microaspiration and that this microaspiration causes a “vicious cycle” that leads to more inflammation, sarcopenia, dysphagia, and frailty, which all causes further repeated microaspiration [128]. This concept only further strengthens the importance of properly screening and evaluating the elderly for aspiration and dysphagia as well as managing risk factors for their development.

Complications of Endoscopy in the Elderly—Should this Change our Approach to Diagnostic Evaluation?

As previously described, esophagogastroduodenoscopy (EGD) is a valuable diagnostic and therapeutic tool for esophageal dysphagia, but EGD could potentially have more risk for elderly patients who are more frail and have more co-morbidities. In the general population, risk of cardiorespiratory complications are as low as 0.54% and rate of mortality as low as 0.03% [129]. Some studies support the safety of EGD in elderly patients [106, 130, 111•] while others suggest higher risk in very elderly patients [110, 131]. For example, a retrospective study on 62,804 patients by Jang et al. compared EGD in elderly patients 65 years old and younger patients 18–64 years old and found no difference in GI and non-GI complications after EGD, regardless of the type of sedation used [111•]. In a study comparing nonagenarians (aged 90–94) to octogenarians (80–89), there were no differences in immediate complications or 30-day mortality after EGD [132]. On the contrary, in a study by Ryoichi et al., very elderly patient populations older than 85 years old, as compared to younger patients with a mean age of 40.5 were found to have more adverse events (6.3% vs 1.1% $p < 0.01$), independent of comorbidities [110]. A nationwide population-based study by Kim et al. on 1,943,150 patients found age from 70–99 years to be an independent risk factor for increased cardiocerebrovascular disease-related adverse effects after EGD [131]. Of the adverse events after EGD in the elderly, many complications are related to sedation and not the procedure itself [106, 110]. Although elderly patients have different co-morbidities, medication profiles, and frailty that potentially increase the risk of EGD, the literature generally seems to support the safety of EGD in elderly population, though with potential increased risk above 85 years.

Conclusion

Esophageal dysphagia is a common clinical symptom that disproportionately impacts elderly patients in prevalence, quality of life, and complications. While some etiologies of esophageal dysphagia are common in the elderly, the methods of diagnostic evaluation should not significantly differ from younger patients. Given the high prevalence of oropharyngeal dysphagia in the elderly, the significant rate of under-reporting symptoms in this population, and the difficulty of differentiating oropharyngeal and esophageal etiologies, older patients with any suspicion for oropharyngeal dysphagia should be screened by a speech language pathologist before evaluation of esophageal dysphagia. Given the relative safety and high diagnostic yield of EGD, it should not be avoided in the elderly. However, due to complications of dysphagia in older patients, it is even more important to evaluate and diagnose malnutrition and aspiration pneumonia.

Given the high prevalence of oropharyngeal dysphagia in the elderly population and the difficulty in differentiating oropharyngeal and esophageal pathology [53, 55], if patients do not have clear risk factors or symptoms suggestive of esophageal dysphagia, they should undergo oropharyngeal evaluation first, which is also supported by ACR guidelines. Once determined to be esophageal in origin, endoscopy with biopsies should be performed given it has been found to be more cost effective than barium swallow as an initial diagnostic study [105] and its relative safety even in older individuals [106, 130, 111•]. If endoscopy shows obstruction, then further cross-sectional imaging can be considered to assess for extrinsic compression, and same session endoscopic dilation should be considered for strictures [104]. If biopsies and endoscopy are normal, then esophageal dysmotility is more likely, and high-resolution manometry and following workup should be performed according to the Chicago Classification [6••].

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Abbreviations

EoE	Eosinophilic esophagitis
BEDQ	Brief Esophageal Dysphagia Questionnaire
MDQ	Mayo Dysphagia Questionnaire
EAT-10	Eating Assessment Tool
EesAI	Eosinophilic Esophagitis Activity Index
PRO	Patient-reported outcome
I-SEE	Index of Severity for Eosinophilic Esophagitis
SDQ	Swallowing disturbance questionnaire
MDT-PD	Munich Dysphagia Test—Parkinson's Disease

z-POEM	Zenker's peroral endoscopic myotomy
c-POEM	Cricopharyngeal peroral endoscopic myotomy
EAC	Esophageal adenocarcinoma
BE	Barrett's esophagus
GERD	Gastroesophageal reflux disease
AEN	Acute esophageal necrosis
GI	Gastrointestinal
PD	Pneumatic dilation
LHM	Laparoscopic Heller myotomy
POEM	Peroral endoscopic myotomy
OIED	Opioid-induced esophageal dysmotility
LES	Lower esophageal sphincter
EGJOO	Esophagogastric junction outflow obstruction
EGD	Esophagogastroduodenoscopy
HRM	High-resolution manometry
TBE	Timed barium esophagram
FLIP	Functional lumen imaging probe
ACR	American College of Radiology
CT	Computed tomography
IV	Intravenous
EGD	Esophagogastroduodenoscopy

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• Of importance

•• Of major importance

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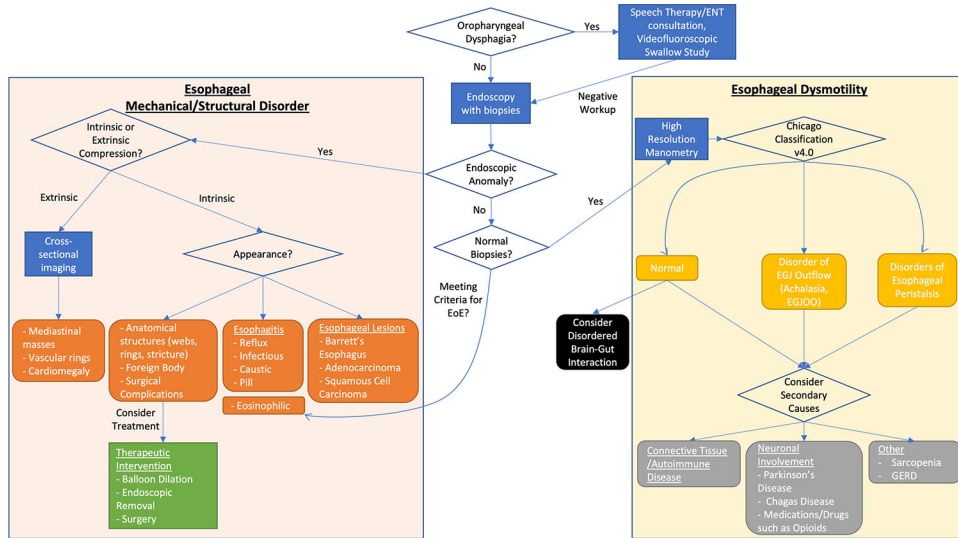


Fig. 1.
A Diagnostic Algorithm for Evaluating Esophageal Dysphagia in the Elderly

Table 1
Clinical Assessment Tools Validated for Different Etiologies of Dysphagia [30–39, 42, 43]

General	Achalasia	Eosinophilic Esophagitis	Parkinson's Disease
Brief Esophageal Dysphagia Questionnaire (BEDQ)	Eckardt Score	Eosinophilic Esophagitis Activity Index (EEsAI)	Swallowing Disturbance Questionnaire (SDQ)
Mayo Dysphagia Questionnaire (MDQ)		Straumann Dysphagia Index	Munich Dysphagia Test - Parkinson's Disease (MDT-PD)
Eating Assessment Tool (EAT-10)		Dysphagia Symptom Questionnaire Index of Severity for Eosinophilic Esophagitis (I-SEE) Brief Esophageal Dysphagia Questionnaire (BEDQ) Mayo Dysphagia Questionnaire (MDQ)	DYPARK questionnaire

Table 2

Comparing Oropharyngeal versus Esophageal Dysphagia [56–58]

	Oropharyngeal	Esophageal
Sensation	Difficult initiating a swallow	Food getting stuck
Timing	Within 1 s of swallowing	A few seconds after swallowing
Associated symptoms	Nasal regurgitation Coughing Drooling Swallowing or breathing with gurgling	Chest pain (retrosternal) Odynophagia Regurgitation (often after lying flat)
Past Medical History	Neurologic Conditions (Stroke, Parkinson's disease, ALS) Thyrototoxicosis Head/Neck Surgery or Radiation Prolonged Intubation	Connective Tissue Diseases (Systemic Sclerosis) Autoimmune Conditions (Rheumatoid arthritis, SLE, Sjogren's syndrome) Complications of Chronic GERD (reflux esophagitis, peptic strictures, Barrett's esophagus/esophageal cancer, upper GI bleed)

ALS Amyotrophic Lateral Sclerosis, *SLE* Systemic Lupus Erythematosus, GERD Gastroesophageal Reflux Disease, *GI* gastrointestinal

Table 3

Etiologies of Dysphagia [56]

Mechanism of Dysphagia	Intrinsic	Specific Etiology
Structural/Mechanical	Intrinsic	Esophageal Tumors Anatomic Structures: Rings, Webs, Strictures Inflammation (Esophagitis): Pill, Infectious (CMV, HSV, Candida), Eosinophilic, Caustic, Reflux, Foreign Body, Dissecans Superficialis Ischemia: Acute Esophageal Necrosis
	Extrinsic	Surgeries: Laryngeal/Esophago gastric Resections, Fundoplication
		Mediastinal Masses Vascular Rings Cardiomegaly
Esophageal Dysmotility	Primary	Primary Disorder of LES relaxation (Achalasia; EGJOO) Hypomotility in the Esophageal Body (Absent Contractility; Ineffective Esophageal Motility) Spastic Esophageal Conditions (Distal Esophageal Spasm; Hypercontractile Esophagus)
	Secondary	Muscular involvement: Sarcopenia Connective Tissue Disease: Systemic Sclerosis (limited and diffuse) Neuronal Involvement: Parkinson's Disease, Chagas disease, Diabetes, Medications/Drugs (eg Opioids) Autoimmune Disease: Rheumatoid Arthritis, Systemic Lupus Erythematosus, Sjogren's Syndrome

CMV cytomegalovirus, HSV herpes simplex virus, LES lower esophageal sphincter, EGJOO esophago gastric junction outflow obstruction