

Diagnostic evaluation of dysphagia

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SUMMARY

Taking a careful history is vital for the evaluation of dysphagia. The history will yield the likely underlying pathophysiologic process and anatomic site of the problem in most patients, and is crucial for determining whether subsequently detected radiographic or endoscopic 'anomalies' are relevant or incidental. Although the symptoms of pharyngeal dysphagia can be multiple and varied, the typical features of neurogenic pharyngeal dysphagia are highly specific, and can accurately distinguish pharyngeal from esophageal disorders. The history will also dictate whether the next diagnostic procedure should be endoscopy, a barium swallow or esophageal manometry. In some difficult cases, all three diagnostic techniques may need to be performed to establish an accurate diagnosis. Stroke is the most common cause of pharyngeal dysphagia. A videoradiographic swallow study is vital in such cases to determine the extent and timing of aspiration and the severity and mechanics of dysfunction as a prelude to therapy.

KEYWORDS diagnosis, dysphagia, esophagus, physiopathology, swallowing

REVIEW CRITERIA

PubMed was searched in November 2007 with the following keywords alone and in combination: "dysphagia", "diagnosis", "esophageal", "pharyngeal", "physiopathology", "swallowing", "structural", "motor", and "neurogenic". The search was restricted to English-language, full papers. Papers from the author's collection of articles were also considered. The reference list was updated in March 2008.

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Learning objectives

Upon completion of this activity, participants should be able to:

- 1 Identify factors in the patient history that are useful in diagnosing the etiology of dysphagia.
- 2 List symptoms that suggest oropharyngeal dysfunction.
- 3 List valuable ancillary tests in the diagnostic evaluation of dysphagia.
- 4 Specify diagnostic tools that can be used when the etiology of dysphagia is unclear.

Competing interests

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INTRODUCTION

Dysphagia—difficulty with swallowing—is a common condition, reported by 5–8% of the general population aged over 50 years,¹ and by 16% of the elderly.² Dysphagia, particularly oropharyngeal dysphagia, is even more common in the chronic-care setting; up to 60% of nursing-home occupants have feeding difficulties that include dysphagia.³

This Review focuses on the diagnostic evaluation of dysphagia, with emphasis on the importance of taking a good history, and describes how to interpret findings from the three most useful investigative modalities—radiography, endoscopy and esophageal manometry. There tends to be an over-reliance on the diagnostic supremacy of endoscopy, with a corresponding

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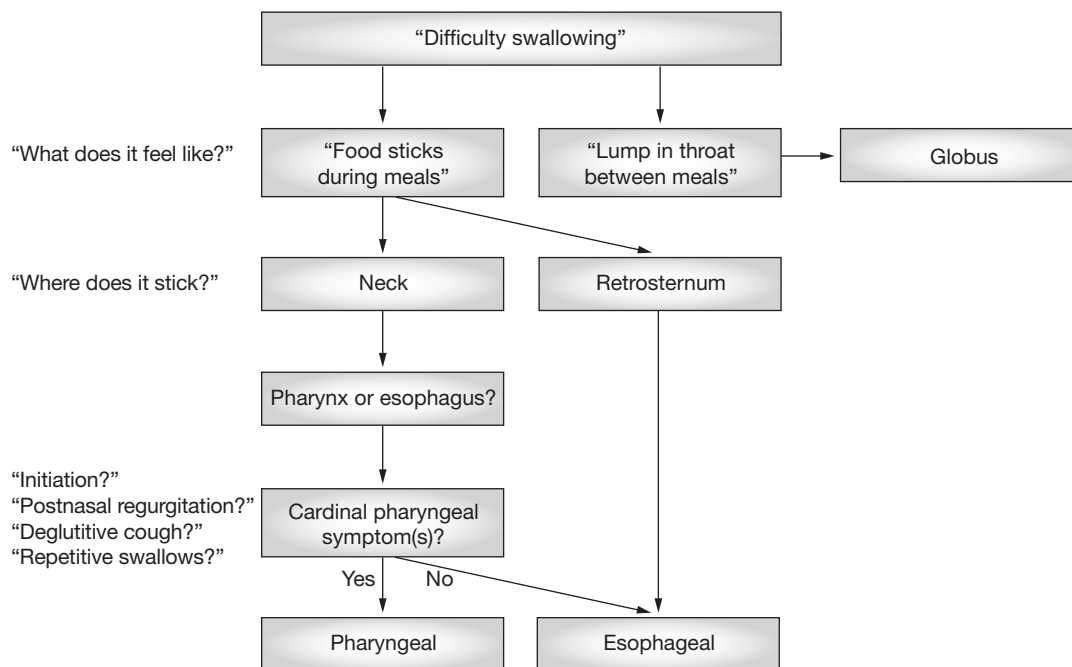


Figure 1 Algorithm used by the author to determine the likely anatomical location of the problem.

neglect of the utility of radiology. At times all three modalities can fail to yield a diagnosis, and what to do in this circumstance is discussed.

THE IMPORTANCE OF A THOROUGH HISTORY

The value of a careful history cannot be over-emphasized, and obtaining such a history before deciding which investigative algorithm to use is mandatory. Reports have indicated that a good history will elucidate the anatomical site and the likely cause of dysphagia in 80% of cases.^{4,5} Typically the patient will describe food 'sticking' or 'holding up', either retrosternally or in the neck, but at times the presenting symptoms may be atypical. Atypical symptoms of dysphagia include meal-related regurgitation (often reported as vomiting), a sense of fullness or filling up retrosternally, or hiccup during meals.⁶

Three fundamental aims should be met when taking a dysphagia history. The first is to establish whether or not dysphagia is actually present; that is, to distinguish true dysphagia from globus sensation, xerostomia or odynophagia. The second is to determine whether the site of the problem is esophageal or pharyngeal (Figure 1). The third is to distinguish a structural abnormality from a motor disorder (Figure 2). These avenues of enquiry are

outlined below in an order that corresponds to that of a highly effective diagnostic algorithm.

Does the patient actually have dysphagia?

Both clinicians and patients may mistake the purely sensory symptom of globus for dysphagia. Globus is an extremely common, nonpainful sensation of a lump, fullness or tightness in the throat of unknown etiology, in which deglutitive food-bolus transport is unimpaired.^{7,8} Indeed, globus sensation is usually most apparent to the patient between meals, is not necessarily related to the act of swallowing, and is usually alleviated by eating. A very useful question to ask during the consultation is, "Do you feel it right now?" A positive response clearly confirms that the presence of this symptom is dependent upon neither food ingestion nor swallowing. Xerostomia (dry mouth) is frequently accompanied by dysphagia and is a common symptom in the elderly, present in 16% of men and 25% of women.⁹ Dysphagia is attributed to loss of both an important swallow stimulus and the lubricating qualities of saliva. Dysphagia is distinguished from odynophagia (pain on swallowing) by the perception of an actual bolus hold-up and by the duration that the sensation is perceived. Odynophagia is generally more transient than dysphagia, and persists only

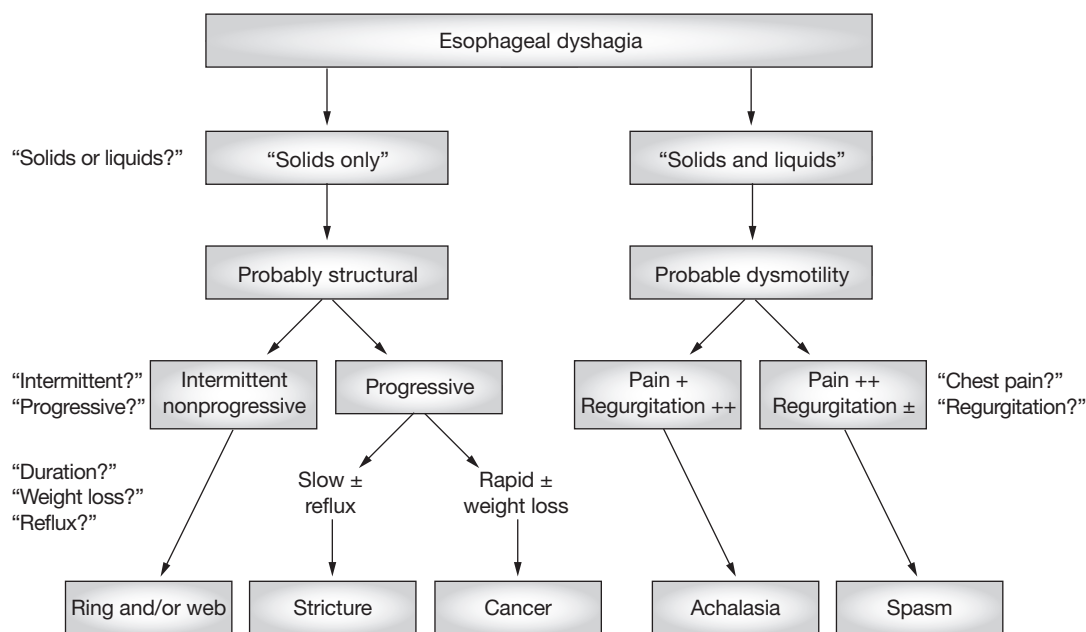


Figure 2 Algorithm used by the author to differentiate between esophageal disorders that cause dysphagia. Permission obtained from Elsevier © Cook IJ (2008) Dysphagia and odynophagia. In *Gastroenterology and Hepatology: A Clinical Handbook*, 15–26 (Eds Talley NJ *et al.*) Sydney: Churchill Livingstone.

during the 15–30 s that a bolus takes to traverse the esophagus.

What are the temporal and associated factors?

The circumstances that surround symptom onset, duration and progression of dysphagia provide useful diagnostic information. Malignant dysphagia usually presents with a short history of progressive dysphagia that is frequently associated with weight loss. A gradual onset of dysphagia, sometimes associated with heartburn, might suggest that the patient has a peptic stricture.

A long history of intermittent, nonprogressive, solid-bolus dysphagia is highly suggestive of an esophageal mucosal ring or rings. In a young, male patient this presentation is most commonly attributable to a multiringed esophagus associated with eosinophilic esophagitis. In a patient over the age of 40 years, this presentation is frequently caused by the presence of a Schatzki's ring.¹⁰ A history of Raynaud's phenomenon should be sought: although Raynaud's phenomenon is a common symptom in the community, it is invariably present in patients with scleroderma esophagus. Oropharyngeal dysphagia usually has a neurological basis.^{11,12}

A sudden onset of dysphagia, often in association with other neurological symptoms or signs, may indicate that the dysphagia has a cerebrovascular cause such as stroke. A prior history of stroke might be apparent. Symptoms of bulbar muscle dysfunction or other brain-stem symptoms, such as vertigo, nausea, vomiting, hiccup, tinnitus, diplopia and drop attacks, should also be sought.

A subacute or insidious onset of oropharyngeal dysphagia is consistent with disorders such as inflammatory myopathy, myasthenia, or amyotrophic lateral sclerosis. Widespread neuromuscular symptoms, such as dysarthria, diplopia, limb weakness or fatigability, are variably present in patients with motor neuron disease, myasthenia and myopathy. Tremor, ataxia or unsteady gait might indicate the presence of an underlying movement disorder such as Parkinson's disease.¹²

Where is the site of bolus hold-up?

Retrosternal bolus hold-up indicates that the disorder lies within the esophagus. However, the patient's perception of an apparent bolus hold-up in the neck has low diagnostic specificity, and cervical localization *per se* does not help the clinician to distinguish pharyngeal from

Box 1 Etiology of esophageal dysphagia.**Structural disorders**

Inflammatory and/or fibrotic strictures

- Peptic
- Caustic
- Pill-induced
- Radiation-induced

Mucosal rings and webs

- Schatzki's ring
- Multiringed esophagus (eosinophilic esophagitis)

Carcinoma

- Primary (squamous, adenocarcinoma)
- Secondary (e.g. breast, melanoma)

Disorders related to systemic diseases

- Pemphigus and pemphigoid conditions
- Lichen planus
- Scleroderma (multifactorial)

Intramural lesions

- Leiomyoma
- Granular cell tumor

Extramural lesions

- Aberrant right subclavian artery (dysphagia lusoria)
- Mediastinal masses
- Bronchial carcinoma

Anatomical abnormalities

- Hiatal hernia
- Esophageal diverticulum

Motility disorders^a

Achalasia and achalasia-like disorders

- Idiopathic (classic) achalasia
- Atypical disorders of lower esophageal sphincter relaxation
- Chagas disease
- Pseudoachalasia

Hypomotility secondary to systemic disease (e.g. scleroderma, other collagen vascular disorders, amyloid, diabetes)

^aAdapted from data presented in reference 31.

esophageal causes of dysphagia. Owing to viscerosomatic referral, in 30% of cases the perceived site of hold-up is above the suprasternal notch when the actual hold-up is within the esophageal body.^{13–15} The questions that immediately follow determination of the perceived site of bolus hold-up aim to differentiate pharyngeal from esophageal disorders.

Does the patient report symptoms that are predictive of oropharyngeal dysfunction?

The array of symptoms that can be reported by patients with oropharyngeal dysfunction is large.¹² However, there are four symptoms that have high specificity for oropharyngeal dysfunction: delayed or absent oropharyngeal swallow initiation; deglutitive postnasal regurgitation or egress of fluid through the nose during swallowing; a deglutitive cough indicative of aspiration; and the need to swallow repetitively to achieve satisfactory clearance of swallowed material from the hypopharynx. If one or more of these four symptoms are present then the cause of dysphagia is probably oropharyngeal, either structural or neuromyogenic, and further history taking and investigation should proceed accordingly (see below).¹²

Several supportive, but less-specific symptoms of oropharyngeal dysphagia are possible: bolus hold-up in the neck, piecemeal swallows, oral spill or drooling, dysphonia, throat clearing, garbled voice and weight loss. Pain on swallowing or a persistent sore throat may indicate malignancy. Immediate expectoration of an offending bolus is indicative of bolus retention in the hypopharyngeal or cricopharyngeal region. Delayed regurgitation of old food is a typical symptom of a large pharyngeal diverticulum. Dysphagia solely for solids is indicative of a structural lesion, such as a stenosis, web or tumor. However, distinguishing between dysphagia for liquids and solids has little diagnostic value in the separation of oropharyngeal from esophageal dysphagia. Indeed, the specific type of mechanical pharyngeal dysfunction, rather than the overall presence of pharyngeal dysfunction, dictates which bolus type generates the most symptoms.

WHEN THE HISTORY IS SPECIFIC FOR SUSPECTED ESOPHAGEAL DYSPHAGIA

If esophageal dysphagia is suspected, the next step is to establish whether the cause is a structural or motor disorder (Box 1). There are several questions that can help to identify which type of cause is more likely.

Is the dysphagia for solids or liquids?

Typically, patients who have a motor disorder (e.g. achalasia or diffuse spasm) will describe dysphagia for liquids and solids, whereas patients who have structural disorders will describe dysphagia for solids only.¹⁴ Of course, once a solid bolus becomes impacted, the patient will

report dysphagia for liquids and solids, so the question as to whether the patient has difficulty swallowing liquids needs to be phrased unambiguously. As the caliber of the esophagus narrows, the size of the solid bolus required to cause obstruction becomes progressively smaller.

How long has dysphagia been present? Is it intermittent? Is it progressive?

If the problem is likely to be a structural esophageal disorder, asking how long the dysphagia has been present for and whether it is intermittent and/or progressive will help to define the likely cause. Slowly progressive, long-standing dysphagia, particularly against a background of reflux, is suggestive of a peptic stricture. However, the physician should remember that the severity of heartburn correlates poorly with esophageal mucosal damage.¹⁶ For example, patients who have severe mucosal changes, including strictures and Barrett's mucosa, could have had minimal or no heartburn in the immediate past.¹⁷ A short history of dysphagia—particularly with rapid progression (weeks or months) and associated weight loss—is highly suggestive of esophageal cancer. Long-standing, intermittent, nonprogressive dysphagia purely for solids is indicative of a fixed structural lesion such as a distal esophageal ring or proximal esophageal mucosal web.¹⁸

What does the patient do when the bolus sticks?

Sipping water will frequently relieve an obstruction that is related to a bolus holding up at a structural lesion. However, immediate regurgitation of the swallowed water in this context is indicative of complete esophageal obstruction by the bolus. If the bolus catches at the level of the cricopharyngeus patients quickly learn not to sip water as it results in immediate coughing and choking owing to laryngeal penetration. In this case, regurgitation during meals generally indicates a structural lesion. However, regurgitation between meals (often described as 'bubbly saliva' or 'mucus'), with or without food particles, is suggestive of dysmotility (see below).

Does the patient regurgitate or experience chest pain or discomfort?

The three cardinal features of esophageal dysmotility are dysphagia (for solids and liquids), chest pain and regurgitation.¹⁹ If the problem is likely to be an esophageal motility disorder, asking

whether the patient regurgitates or experiences pain or discomfort will allow the likely cause to be defined.

Regurgitation during meals, as well as spontaneous regurgitation between meals or at night, is highly suggestive of dysmotility.¹⁹ Unlike regurgitation that is related to gastroesophageal reflux, the regurgitated fluid and/or food in patients with esophageal dysmotility is generally not noxious to taste. In addition, spasm or achalasia typically cause chest pain. Although this chest pain is frequently described as 'heavy' or 'crushing', it can be indistinguishable from the typical 'heartburn' of reflux.²⁰ The pain frequently occurs during meals, but it can be quite unpredictable and sporadic or nocturnal. Sipping antacids or even water can relieve the pain related to dysmotility, which further confuses its distinction from reflux-related pain.

When esophageal dysmotility is strongly suspected, distinguishing between achalasia and esophageal spasm can be difficult. Achalasia is much more common than spasm.²¹ In patients with achalasia, chest pain might be prominent early in the disease, but over the years this pain tends to diminish and may disappear as dysphagia and regurgitation worsen.²² By contrast, the chest pain associated with spasm is the predominant symptom and can be quite severe. Owing to poor esophageal clearance, regurgitation is generally more pronounced in patients with achalasia than it is in patients with spasm. The esophagus generally dilates over time in patients with achalasia but dilation is less prevalent in patients with spasm. Finally, there can be significant overlap between these two syndromes^{23,24} and spasm can evolve towards typical achalasia over time, as both share a similar underlying inhibitory neuropathic process.²⁵ Esophageal motility disorders can be classified as primary (e.g. achalasia or diffuse esophageal spasm) or secondary (e.g. scleroderma) (Box 1). The dominant symptom in patients with scleroderma esophagus is reflux and regurgitation. When dysphagia is present it generally indicates that a peptic stricture has developed.

EXAMINATION OF THE PATIENT WITH DYSPHAGIA

In patients with esophageal dysphagia, the physical examination is generally unremarkable. However, the patient's skin should be examined for features of connective tissue disorders, particularly scleroderma and CREST (calcinosis,

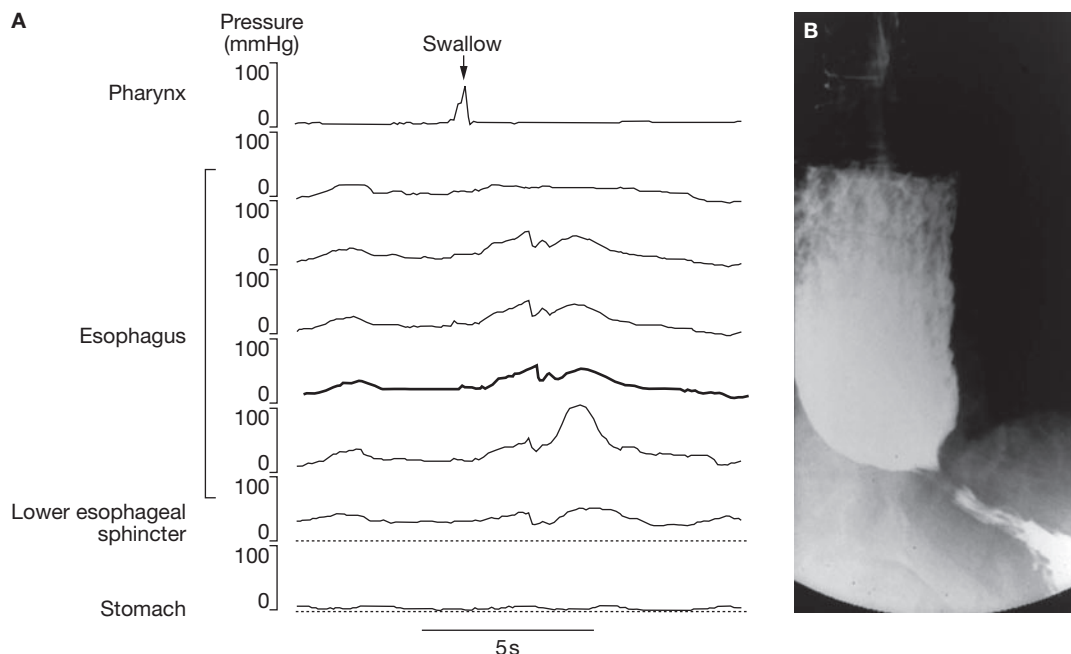


Figure 3 Findings from a patient with idiopathic achalasia. **(A)** Manometric tracing. In response to the water swallow (marked at top), there is a partial relaxation of the lower esophageal sphincter, in that the nadir pressure does not drop to gastric baseline pressure. Note also that there is no evidence of peristalsis. The broad, synchronous pressure waves seen extending along the esophageal length are caused by a rise in pressure within the dilated, aperistaltic esophagus. **(B)** Barium swallow. Note that the dilated esophagus contains a substantial residue of food, fluid and barium medium, which is held up by a tightly closed sphincter that demonstrates the hallmark 'bird beak' tapered appearance.

Raynaud's phenomenon, esophageal dysmotility, sclerodactyly and telangiectasia) syndrome. Muscle weakness or wasting might be evident if myositis is present, and myositis can overlap with other connective tissue disorders that affect the esophagus. Signs of malnutrition, weight loss and pulmonary complications from aspiration should be looked for. If pharyngeal dysphagia is suspected, evaluation for neuromuscular disorders is important (see below). However, the absence of neurological signs does not preclude the presence of significant pharyngeal neuromuscular dysfunction.²⁶

Investigation of esophageal dysphagia

The most valuable investigations in patients with suspected esophageal dysphagia include a barium swallow study, endoscopy and esophageal manometry. Endoscopy will frequently obviate the need for barium radiology. However, a barium swallow can be very useful when endoscopy fails to identify an abnormality and/or when the results of esophageal motility studies are atypical or equivocal. For example, a so-called

corkscrew esophagus, which is indicative of diffuse esophageal spasm, can be identified by barium swallow. The hallmark appearance of achalasia is esophageal dilatation with a tapered 'bird beak' appearance at the cardioesophageal junction. The esophagus typically contains a column of barium medium, often mixed with food and mucus (Figure 3). Barium radiology will identify structural abnormalities such as diverticula, strictures, rings, webs and tumors. If a mucosal ring is suspected, the radiologist should (but unfortunately often does not) routinely obtain a prone oblique view to provide sufficient esophageal distension to render the ring apparent, followed by a barium pill or marshmallow swallow to accurately identify the site of holdup.²⁷

Endoscopy

Endoscopy is indicated for virtually every dysphagic patient. A normal endoscopy, however, does not rule out the presence of a structural abnormality. An esophageal mucosal ring is not always apparent unless adequate distension of the

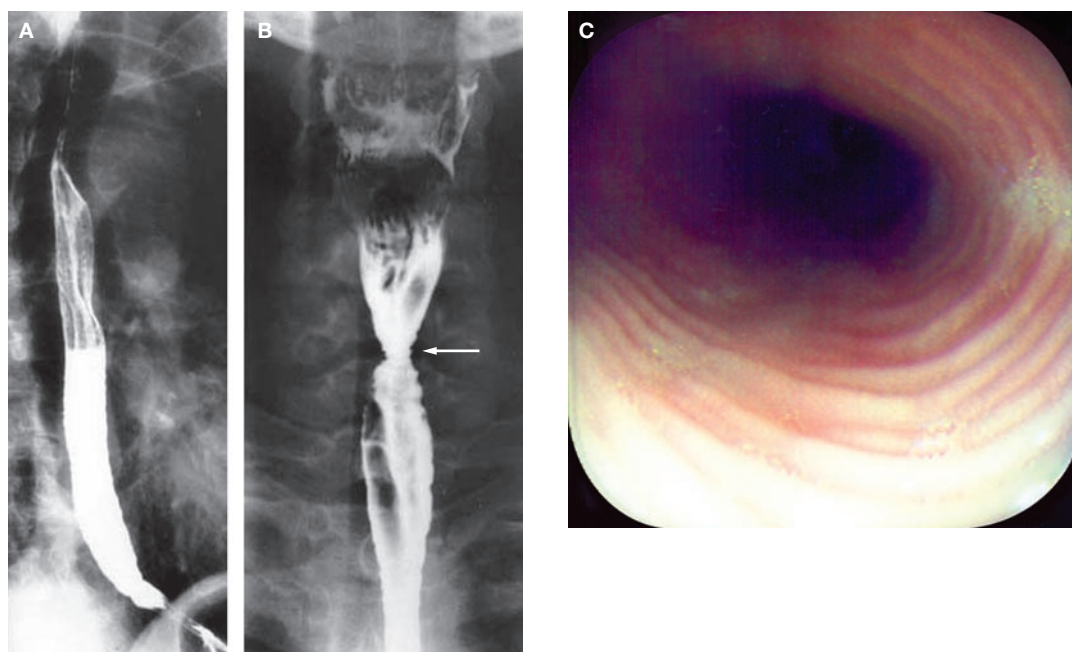


Figure 4 Findings from a 28-year-old male with a multiringed esophagus due to eosinophilic esophagitis. (A and B) Barium radiographs. Note the 'feline' corrugated appearance throughout the esophageal length that is clearly seen in part A, and in the endoscopic image (C). One of the tight mucosal rings is apparent (arrow) in the radiograph (B).

esophagus has been achieved by insufflation. The 'multiringed' esophagus, which is characteristic of eosinophilic esophagitis, may have very subtle features such as longitudinal furrows. The 'feline' esophagus typically has corrugations consistent with longitudinal shortening, as well as the development of mucosal rings (Figure 4). Distal and midesophageal biopsies should be considered, to rule out eosinophilic esophagitis, in any case of unexplained dysphagia or food impaction.^{28,29} Reflux esophagitis and infective esophagitis (e.g. that caused by herpes simplex, cytomegalovirus or *Candida* infections) have typical appearances.³⁰ Strictures can be biopsied and dilated at the time of endoscopy. The finding of food, fluid or salivary residue within the esophagus is highly suggestive of dysmotility, particularly achalasia.

Esophageal manometry

If the endoscopic findings are normal or the patient's history suggests a dysmotility disorder, esophageal manometry is the best technique to confirm this diagnosis. Two features are characteristic of achalasia: failure of the lower esophageal sphincter to relax, and aperistalsis.³¹ A hypertensive lower esophageal sphincter is a typical although not ubiquitous finding.

Esophageal spasm is diagnosed in the context of normal sphincter relaxation, synchronous esophageal pressure waves (in >20% of wet swallows) and intermittent, but normally progressive, esophageal peristalsis.³² High-amplitude esophageal pressure waves (>180 mmHg) and prolonged (>6 s) esophageal pressure waves are sometimes present, but not necessary for diagnosis.³¹ The features of scleroderma esophagus are the complete absence of peristalsis and absence of tone in the lower esophageal sphincter.³¹ Despite the virtual absence of propulsive motor activity in scleroderma esophagus, dysphagia in patients with this syndrome is generally related to reflux-induced strictures.

The increasingly widespread use of high-resolution manometry has provided a precise picture of esophageal pressure patterns.³³ This technique is simpler to perform and provides the clinician with a more readily interpretable image than traditional manometry. High-resolution manometry can be readily performed using miniature, multichannel, water-perfused catheters³⁴ or solid-state catheters.³⁵ Pressures are recorded from up to 36 closely spaced sites along the esophageal body and across the gastro-esophageal junction. A computerized interpolation technique then generates esophageal

Box 2 Etiology of oropharyngeal dysphagia.**Structural**

- Tumor
- Stenosis
 - Postsurgical
 - Radiation
 - Idiopathic
- Zenker's diverticulum
- Cricopharyngeal bar
- Web
- Extrinsic compression

Neuromyogenic

- Stroke
- Head trauma
- Parkinson's disease and parkinsonism
- Amyotrophic lateral sclerosis
- Multiple sclerosis
- Myasthenia gravis
- Myopathies (inflammatory, metabolic)

pressure isocontour lines, which are used to provide a three-dimensional pressure map of the entire organ. This technique has also been successfully applied to studies of the pharynx and upper esophageal sphincter.^{36,37} Subtle motor patterns and disturbances, for example in the junction zone between the proximal and distal esophagus, can be more readily appreciated with high-resolution manometry than with traditional manometry.^{33,38} In addition, high-resolution manometry facilitates differentiation between a restrictive disorder and muscular weakness in the pharyngo-esophageal segment,³⁹ and makes the precise pressure profile across the esophagogastric junction obvious, which enables improved visualization of the diaphragmatic component and of any hiatal hernia.⁴⁰

Multichannel, intraluminal, impedance measurement

Multichannel, intraluminal, impedance measurement exploits the differences in electrical conductance through mucosa, fluid (e.g. refluxate or swallowed bolus) and gas, and has been used for the study of bolus transport through the esophagus during swallowing.⁴¹ Although this method is proving to be a useful research tool, and can detect subtle alterations in esophageal bolus clearance in the context of nonspecific esophageal motor abnormalities,⁴² studies have yet to show whether multichannel, intraluminal, impedance measurement improves diagnostic yields and influences

clinical outcomes when used in addition to other, widely available techniques.

Intraluminal ultrasound

Intraluminal ultrasound can be used to evaluate muscular function, and has shown that hypertrophy of the muscular layer is a hallmark of primary motor disorders.⁴³ Although patients with dysphagia symptoms and normal or non-specific findings on manometry can have muscle hypertrophy on ultrasound imaging, the influence of these observations on clinical practice needs to be clarified.

Investigation of oropharyngeal dysphagia

Pharyngeal dysphagia can be considered to have two broad etiologic categories, namely structural and neuromyogenic disorders (Box 2). The range of potential neuromyogenic causes of pharyngeal dysphagia is broad, but the most common is stroke: at least 50% of stroke patients experience pharyngeal dysphagia.⁴⁴ When the likely underlying cause of pharyngeal dysphagia is considered in any given patient, there are four fundamental issues to consider during work-up. First, a correctable structural lesion should be identified if possible. Second, any underlying systemic condition that might be treatable in its own right should be identified. Third, the risk of aspiration should be established. Fourth, the mechanics of dysfunction should be determined as a precursor to swallow therapy.

Identification of correctable structural causes

Structural abnormalities are often readily diagnosed by endoscopy or radiography. These abnormalities can generally be managed effectively by endoscopy or surgery (e.g. dilatation, resection, cricopharyngeal myotomy).

Identification of treatable systemic disorders

Sometimes the cause of pharyngeal dysphagia is not obvious. In such cases the underlying disease might have a systemic basis that warrants primary therapy in its own right. These conditions include inflammatory myopathy (e.g. polymyositis, dermatomyositis); toxic and/or metabolic myopathy (e.g. thyrotoxicosis, drugs); myasthenia gravis; and extrapyramidal movement disorders (e.g. Parkinson's disease, drug-induced dyskinesia). In addition to a detailed history and physical examination that targets these four categories, a biochemical screen that includes measurement of creatinine

phosphokinase, erythrocyte sedimentation rate, thyroid function markers and acetylcholine receptor antibody levels should be done if in doubt. If these clinical and biochemical indicators suggest muscular or neuromuscular dysfunction, electromyography, perhaps followed by muscle biopsy, should be considered.^{11,45}

Assessment of aspiration risk

Clinical assessment alone underestimates the risk of aspiration by 50%.⁴⁶ An accurate estimation of aspiration risk is achieved by a videoradiographic swallow study, sometimes called the modified barium swallow, which is generally conducted by a speech pathologist in conjunction with the radiologist. The modified barium swallow determines the presence, severity and timing of aspiration. During this examination, the speech pathologist may modify the patient's swallow technique, head posture and swallowed bolus consistency to determine whether aspiration can be eliminated by such maneuvers. This process is important to tailor the patient's management and to decide whether nonoral feeding (via a percutaneous endoscopic gastrostomy or a nasogastric tube) might be indicated.

Assessment of the mechanics of oropharyngeal dysfunction

Again, this assessment is achieved with the aid of a modified barium swallow (with or without manometry). The purpose of this investigation is to determine whether the pattern of dysfunction is amenable to swallow therapy and to establish the optimal food consistency to both minimize aspiration and maximize deglutitive pharyngeal clearance.⁴⁷

IF IMAGING AND MANOMETRY DO NOT YIELD A DIAGNOSIS

If barium radiography, endoscopy and manometry do not yield a diagnosis, the first thing to be done is to go back and review the patient's history. At this point, the diagnostic strategy is guided by whether the history indicated that the cause of dysphagia was likely to be a structural or a motor disorder. Remember that normal endoscopy and barium swallow results do not adequately rule out a structural esophageal disorder.

If a structural disorder is suspected, determine whether the barium swallow study included prone views and a marshmallow or pill swallow, and whether the endoscopic examination included empiric esophageal dilatation. If they

did not, a repeat barium swallow, which includes these maneuvers, together with videoradiographic sequences of the esophageal body (see below) can be very helpful. Mucosal rings and webs, in particular, are frequently overlooked by radiologists unless adequate and deliberate distension of the esophagus is achieved by evaluating the esophageal contours in the prone position, preferably while the patient performs the Valsalva maneuver.^{27,48} Next, the endoscopy should be repeated and empiric esophageal dilatation performed. Although the evidence that supports the practice of empiric dilatation is limited and conflicting,^{49–52} two studies have demonstrated short-term and long-term efficacy as well as safety of this practice when a visual inspection of the esophagus was normal.^{51,52} Equally important in the prediction of subsequent clinical response, however, is the vital diagnostic information that can be gained by inspection of the esophagus immediately after removal of the dilator. Although the diagnostic utility of this practice has not been subjected to systematic evaluation, in my experience the finding of one or more mucosal tears (if present) confirms the site and caliber of any constrictions not previously appreciated visually by the endoscopist. Furthermore, the absence of any post-dilatation mucosal trauma correlates reasonably well with a poor clinical response, because such absence indicates that a mucosal web, ring or a stricture is unlikely to account for the patient's dysphagia (Cook IJ, unpublished observations). In this context, esophageal biopsies may be useful to confirm the presence of conditions such as reflux or eosinophilic esophagitis.²⁹

Eosinophilic esophagitis is an increasingly recognized condition.²⁸ Several typical endoscopic features of eosinophilic esophagitis have been well described, but its endoscopic appearance can also be normal.⁵³ Owing to tissue remodeling, eosinophilic esophagitis is frequently associated with the presence of multiple (and often quite tight) mucosal rings or a narrow-caliber esophagus, which predispose the patient to an increased risk of large mucosal tears and perforation during dilatation.⁵⁴ Accordingly, the likelihood that the patient has eosinophilic esophagitis needs to be considered before endoscopic dilatation is performed. In particular, young male patients who present with intermittent dysphagia or bolus impaction carry a strong chance of having this disorder.⁵⁵ Esophageal dilatation in patients with suspected

eosinophilic esophagitis must be undertaken with caution, and should commence with small dilators. Periodic inspection of the mucosa in between the removal and introduction of sequential sizes of dilator should be performed if significant resistance is encountered during passage of a dilator.

Atypical esophageal motility disorders can provide a major diagnostic challenge. For example, patients with idiopathic achalasia might not have all its classical manometric features. They might have varying degrees of preserved peristalsis over limited segments of the esophagus, or their sphincter relaxation might be only intermittently incomplete or partial.^{31,56} Although the manometric findings in patients with pseudo-achalasia caused by malignancy of the gastric cardia may be indistinguishable from those in patients with primary idiopathic achalasia, these patients can also have partially preserved peristalsis (Cook IJ, unpublished observations). In the context of suspected dysmotility or when manometry findings are atypical, a careful video-radiographic barium swallow that focuses on the esophageal body should provide valuable information about the functional relevance of atypical manometric findings. For example, is there evidence of esophageal spasticity (tertiary waves, or a 'corkscrew' appearance)? Is there evidence of progressive peristalsis in the distal esophagus? Does the lower esophageal sphincter cause significant retention of a vertical column of barium medium, or is there significant esophageal stasis with delayed esophageal emptying? The demonstration of such confirmatory findings can help increase the certainty that an underlying motor disorder is present and can prompt a therapeutic trial of antispasmodic agents, botulinum toxin (e.g. Botox) injection or sphincter disruption.

CONCLUSIONS

In summary, taking a thorough history and following an investigative algorithm should allow a diagnosis to be made for the vast majority of patients with dysphagia. A small proportion of patients have 'nonobstructive' dysphagia; however, this diagnostic category is far from being completely defined. With regard to possible nonobstructive causes of dysphagia, distinguishing between a heightened awareness of esophageal bolus transit and true bolus delay can be difficult.^{49,57} Finally, use of the term 'psychogenic dysphagia' is extremely rarely, if ever, justified.^{14,58}

KEY POINTS

- Taking a careful history from the patient with dysphagia is vital, as the history not only determines which investigative algorithm to use but also elucidates the anatomical site and likely cause of dysphagia in most cases
- The aim of taking a dysphagia history is to establish whether or not dysphagia is actually present, determine whether the site of the problem is esophageal or pharyngeal, and distinguish a structural abnormality from a motor disorder
- The symptoms of pharyngeal dysphagia can be multiple and varied, but the typical features of neuromyogenic pharyngeal dysphagia are highly specific, and can accurately distinguish between pharyngeal and esophageal dysphagia
- Barium swallow, endoscopy and esophageal manometry are the most valuable investigations for patients with suspected dysphagia; however, physicians tend to rely excessively on the diagnostic supremacy of endoscopy while neglecting the utility of radiology
- In some difficult cases it may be necessary to perform barium swallow, endoscopy and esophageal manometry to establish a diagnosis

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