REVIEW ARTICLE

Current evaluation of the dysphagic patient

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Abstract

Dysphagia is a symptom so common and diverse that is often considered as a disease in its own right. Its severity can range from a trivial problem to a lethal condition. It can seriously compromise the quality of life of affected patients, therefore management should be prompt. The implications of dysphagia in healthcare costs are immense. Assessment of dysphagic patients is based on a comprehensive history and thorough examination. In the present review we discuss physiology, aetiology, diagnosis and management emphasizing the role of a multidisciplinary team approach. We also focus on the role of fibreoptic endoscopic evaluation of swallowing which revolutionized over recent years the assessment of the dysphagic patient. Hippokratia 2009; 13 (3): 141-146

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The term dysphagia is derived from the Greek words "dys" + "phagein", meaning "difficulty to eat". It refers to any disruption in the swallowing process during the preparatory transport of bolus from the oral cavity through the pharynx and the oesophagus to the stomach[1]. Swallowing disorders are rather common, have a great impact on the patient's quality of life and increase the cost of medical care. Dysphagia can cause significant morbidity and mortality, especially in the elderly and the paediatric population. The consequences of dysphagia include dehydration, malnourishment, starvation, aspiration pneumonia and airway obstruction[1].

Physiology of swallowing

Normal swallowing involves many levels of the central nervous system, more than 40 paired muscles, and through their attachments, most of the bones of the head and neck[2]. Normal swallowing is divided into four phases: oral preparatory, oral propulsive, pharyngeal and oesophageal. Some authors divide the swallowing process into three phases considering the oral preparation and oral propulsive phases as a single oral phase (Table 1).

Aetiology of dysphagia

Swallowing disorders can be classified according to the affected phase. Impairment of the oral and pharyngeal phase is sometimes called "transfer" dysphagia[3].

Oral and Pharyngeal phase

Neurological diseases

A major cause of dysphagia in adults and perhaps the most frequently encountered in hospitals is cerebrovascular accidents. Oropharyngeal dysphagia is a major risk factor of death from aspiration pneumonia in those patients[4]. Swallowing dysfunction often occurs in patients

Table 1: Phases of normal swallowing

Oral preparatory phase	Food enters oral cavity Mastication and bolus formation
Oral propulsive phase	Tongue elevates and propels bolus to pharynx
Pharyngeal phase	Soft palate elevates to seal nasopharynx Larynx and hyoid bone move anteriorly and upwards True vocal folds adduct False vocal cord adduct Epiglottis moves posteriorly and downwards Respiration stops Pharyngeal wave Upper oesophageal sphincter relaxes Upper oesophageal sphincter opens
Oesophageal phase	Bolus passes to oesophagus Oesophagus contracts sequentially Lower oesophageal sphincter relaxes Bolus reaches stomach

with Parkinson's disease and interferes with their quality of life[5,6].

Dysphagia may also be a symptom of myasthenia gravis, lower motor neuron diseases, amyotrophic lateral sclerosis, multiple sclerosis, Huntington's disease, Alzheimer's disease and in laryngeal nerve injury[7].

Structural abnormalities

Trauma to the head, neck, chest and cervical spine may affect swallowing either directly or indirectly. Neoplasms may cause dysphagia by obstruction, neuromuscular invasion or by the discomfort and dehydration induced. Zenker's diverticulum or pharyngeal pouch is also a cause of dysphagia. It is caused by failure of healthy muscle to relax, leading to functional outlet obstruction and pressure-induced herniation of the mucosa through the Killians dehiscence. It has been recently proposed that Zenker's may probably originate from cricopharyngeal degeneration with fibroadipose replacement[8]. In symptomatic patients, the pouches usually have a diameter of more than 2cm, and are typically locating in the posterior midline, protruding in 90% of the cases to the left cervical region. Dysphagia may also result from enlarged thyroid gland, cervical hyperostosis or ingestion of caustic material.

Iatrogenic

Perhaps the most important group, as many of these causes are preventable. Several operations may affect swallowing, such as mandible resection, laryngectomy, resections of the hyoid bone, operations for orthognathic surgery and tracheostomy[9]. Swallowing problems after head and neck surgery for cancer depend on the extent of the resection, the structures resected, and, to a limited extend, the nature of reconstruction[10]. Radiotherapy results in anatomic and functional changes that cause swallowing disorders due to fibrosis, oedema, xerostomia and myositis[10]. Chemotherapy can also cause side effects with an indirect impact on swallowing and nutrition causing nausea, vomiting, weakness, fatigue, mucositis and odynophagia[10,11]. Intubation for more than 48h may cause dysfunction of the swallowing mechanism by a combination of muscle "freezing" attributable to non-use while intubated and loss of proprioception attributable to mucosal lesions[12].

Medications may affect swallowing by causing sedation, pharyngeal weakness or dystonia (benzodiazepines, neuroleptics, anticonvulsants), myopathy (corticosteroids, lipid-lowering drugs), xerostomia (anticholinergics, antihypertensives, antihistamines, antipsychotics, anticonvulsants, antiparkinsonian agents, antidepressants, anxiolytics, diuretics)[3]. Sedatives are potentially the most disruptive because they alter brain stem regulation and delay cricopharyngeal relaxation through undesirable extrapyramidal side effects. Local anaesthesia may depress oropharyngeal sensation and reduce the afferent input necessary for successful swallow and may also decrease the ability to cough[2].

Infections

Pharyngo-tonsillitis is the most common cause of dysphagia. Swallowing disorders can also be caused by infections that induce neuromuscular dysfunction, such as diphtheria, tetanus, botulism. Herpetic lesions of the oropharynx and candida infections are overlooked causes of dysphagia, often found in elderly and debilitated patients. Immunosuppressed patients, including AIDS sufferers are often affected by opportunistic herpetic, fungal or cytomegalovirus mucosal infections[7]. Peritonsillar and deep neck abscesses and Ludwig's angina can produce dysphagia due to pain, dehydration and aerodigestive tract compression[2].

Inflammatory

The cause of dysphagia in connective tissue or autoimmune diseases varies within the disease groups. Treatment of the underlying disease with corticosteroids or immunosuppressive agents does not usually help the course of dysphagia[7].

Other causes (less common)

Globus pharyngeus may present with throat pain, catarrh, discomfort in the throat, and difficulty in swallowing[13]. Dysphagia in schizophrenics usually is related to extended use of neuleptics. Salivary flow may be affected in depressive psychoses and high states of anxiety. Amyloidosis involving the tongue may seriously affect deglutition basically acting as a structural abnormality[14]. In diabetes, dysphagia is related to diminished amplitude of pharyngeal contractions[2].

Oesophageal phase

Mechanical obstruction from webs, strictures, tumors or by extrinsic compression (as in mediastinal masses, cardiovascular diseases) and oesophageal motility disorders can cause dysphagia. Oesophagitis is a rather common medical condition usually caused by gastroesophageal reflux. Gastroesophageal reflux disease (GORD) may cause reflux oesophagitis and peptic strictures giving rise to dysphagia.

Less frequent causes include oesophagitis by opportunistic infections (immunocompromised patients), radiation oesophagitis, and oesophagitis from direct erosive effects of ingested medication or corrosive agents. Oesophageal candidiasis, a common primary care problem has been increasing in incidents due to use of immunosuppressive drugs. Eosinophilic oesophagitis is a rarely diagnosed condition involving eosinophil infiltration of the oesophageal mucosa and creating significant symptoms of dysphagia[15].

Symptoms

Symptoms often associated with dysphagia and/or aspiration are summarized in Table 2.

Swallowing evaluation

Dysphagia is a multidimensional problem with a fre-

Table 2: Symptoms often associated with dysphagia and/or aspiration.

- Heartburn
- Atypical chest pain
- Globus pharyngeus
- Sensation of food sticking in the chest/throat
- Coughing or chocking with or after swallowing
- Regurgitation
- Constant throat clearing
- Hoarse or "wet" voice
- Drooling
- Change in dietary habits
- Prolonged meal times
- Recurrent pneumonia
- Unexplained weight loss

quent occurrence in the primary care and a detailed history and examination are crucial for early diagnosis and appropriate referral[7].

The goals in swallowing evaluation are to identify the presence of dysphagia (for example silent aspiration), to gather information about the anatomic structures involved (oral, pharyngeal or oesophageal dysphagia), to determine the risk of aspiration, to acquire clues to the aetiology and to establish a treatment plan).

The evaluation of a patient complaining for dysphagia starts with a general medical history, followed by a specific history of the swallowing problem. Then, a clinical examination and the appropriate investigations should follow.

Evaluation of dysphagia should involve several medical disciplines including an otolaryngologist and a speech therapist, a gastroenterologist, a surgeon, an oncologist, a radiologist, a neurologist and a dietitian[11].

History

Important points when evaluating swallowing problems are summarized in Table 3.

Medical history will start with the subjective complaints that will help identify disorders that either specifically cause dysphagia or any disorders that could affect neurologic function. Also, information about recurrent pneumonia (aspiration) or history of dehydration and malnourishment should be obtained. The patient should also be asked about his drug history. A detailed surgical history is necessary, especially head and neck and upper gastrointestinal operations.

The patient should be specifically asked for the presence of a "difficult swallow", odynophagia, regurgitation or repeated swallows. Also, symptoms such as coughing or choking during or after swallowing point to aspiration.

Information should be obtained about the different food consistencies which are associated with dysphagia. Patients who have dysphagia of solids are more likely to have mechanical obstruction or muscular weakness that leads to decreased propulsion, muscular dysmotility, or spasm. Patients with dysphagia of liquids often have neuromuscular disorders or muscular weakness. Dysphagia of both solids and liquids is typical of oesophageal motility disorders[16].

Table 3: History taking in swallowing evaluation

General medical history	Disorders that specifically cause dysphagia Disorders that could affect neurologic function Medications Recurrent pneumonia (aspiration?) Dehydration?
Surgical history	Operations involving the head, neck, spine
Associated symptoms	Odynophagia Regurgitation Multiple swallows Coughing or chocking during/after the swallow Weight loss Hoarseness
Food consistencies	Solid /liquid/ both?
Localization of pain	
Symptom duration	Intermittent, constant or progressive?
Symptom onset	

Finally, the physician should ask about duration and onset of symptoms. The onset may range from sudden to gradual. It is occasionally difficult for the patient to accurately pinpoint the exact onset of his/her dysphagia. Symptoms may also be intermittent, constant or progressive, the latter relating more towards neurologic or neoplastic lesions.

Clinical evaluation

Key examination points in the evaluation of the dysphagic patient appear in Table 4.

First step on the patient's examination should be to determine his general status, including body mass index. Clinical assessment should start with a simple swallow test, followed by observation for a cough response. Then, in a systemic examination starting from the "top", oral cavity should be inspected for ulcerations, exophytic growths, abnormal motion of the palate, mucosal drying, tongue appearance and motion, and dental status. Otoscopy is important, as otalgia is occasionally a referred symptom of laryngeal and hypopharyngeal cancer. A nasal evaluation is necessary to detect local tumors or postnasal drip.

The examiner should elicit the gag reflex by stroking

Table 4: Key examination points in the evaluation of the dysphagic patient.

General status	Mental status, aphasia, bedridden?
Swallow evaluation	Cough? Wet voice?
Observation Oral cavity Palate Tongue Dental status Neck	 Ulcerations Exophytic growths Abnormal motion Mucosal drying Swellings Asymmetry
Palpation Neck	 Point tenderness Masses Swellings
Auscultation	Carotid bruits?
Otologic examination	Otalgia? Dizziness?
Nasal evaluation	Local tumors? Postnasal drip?
Fibreoptic laryngoscopy Transnasal unsedated oesophagoscopy	
Neurologic examination	

the pharyngeal mucosa with a tongue depressor. Absence of the gag reflex does not necessarily indicate that the patient is unable to swallow safely. Many patients with an absent gag reflex have normal swallowing, and some patients with dysphagia have a normal gag reflex. Important information could arise whether there is pulling of the palate to one side during gag reflex testing, which could indicate weakness of the contralateral palate muscles[7]. Finally, the examiner should perform a gross neurologic examination, focusing on the lower cranial nerves (IX-XII).

Investigations

More objective specialized tests such as fibreoptic endoscopic swallowing study (FEESS), videofluoroscopic swallowing study (VFSS), manometry, oesophagoscopy, electromyography, and ultrasound imaging must be considered for thoroughly assessment and management of dysphagia.

The history and physical examination can often direct the choice of imaging or other investigations. If oral or pharyngeal phase dysfunction is suspected, VFSS and FEESS should be considered, while when an oesophageal disorder is suspected barium swallow, manometry and endoscopy may be more appropriate. FEESS and VFSS are the most widely used tests and are considered complementary in evaluating swallowing disorders[17].

Videofluoroscopic swallowing study (VFSS)

Videofluoroscopic swallowing study (VFSS) remains the gold standard for analyzing the swallowing physiology and detecting aspiration[17]. A VFSS takes about 10 minutes to complete and is painless. It is performed by a radiologist under the direction of a speech therapist and/or a laryngologist. The patient swallows solids and liquids mixed with barium while radiographic images are displayed on a monitor and videotaped. Measured amounts of barium bolus are "followed" from the lips to the stomach (assessing all phases of deglutition) using various food consistencies (three different consistencies). VFSS demonstrates anatomic structures, identifies aspiration, allows assessment of compensatory strategies, is easy to be videotaped for analysis, and can be paired with manometry (manofluorography). Unfortunately, VFSS is unable to delineate subtle anatomic changes. It is also expensive, difficult to be applied to fragile or immobile patients, and it involves some radiation exposure. Finally, VFSS does not assess pharyngeal sensation directly. VFSS also carries a degree of subjectivity in its interpretation. In a recent study, Stoeckli et al[18] highlighted the lack of objectivity of VFSS; only aspiration and Zenker's diverticulum were evaluated with high reliability, while the reliability of all other parameters of oropharyngeal swallow was found to be poor.

Fibreoptic Endoscopic Swallowing Study (FEESS)

This can be done at bedside and it is performed with the use of flexible fibreoptic laryngoscope that passes transnasally into the pharynx and observes swallowing. It provides detailed information about the nose, pharynx, larynx and even the trachea (in some patients with decreased sensation). Different food consistencies, mixed with blue dye, can be used to evaluate swallowing, identify pooling of material in the hypopharynx and upper oesophageal sphincter and aspiration.

Sensation can be tested by adding air pulsation through the scope to provide a comprehensive assessment of pharyngeal sensation in areas that are difficult to be accessed otherwise[19], or touching the tip of the endoscope to various areas of the hypopharynx and the larynx. FEESS has the advantages of a direct visualization of the structures involved in deglutition, there is no radiation exposure, retesting is easy and can be used for evaluation during rehabilitation. The main disadvantage of FEESS is its limited ability to detect aspiration, because the field is often obscured by epiglottic excursion. Furthemore, FEESS does not allow studying of the oral and oesophageal phases of swallowing. As such, the study is most useful for assessing swallowing ability and for patient teaching, rather than comprehensive evaluation of the swallowing function on its own[20].

Scintigraphy

Radionuclide ingestion is the most accurate tech-

nique for precise volume quantification. It can diagnose the presence and amount of reflux aspirate and salivary aspiration[21]. Additionally, oropharyngoesophageal scintigraphy is a simple technique in evaluating patients who undergo oral surgery for neoplasms of the hard and soft palate[22]. It may also be useful in the diagnosis of Zenker's diverticulum because of its sensitivity, low cost and the high tolerance of elderly patients[23].

Ultrasound

Ultrasound scanning of the neck is a non-invasive method in the investigation of laryngeal elevation during swallowing. It allows direct visualization of impaired laryngeal motion in patients with neurogenic dysphagia[24].

Magnetic resonance imaging (MRI)

Recently, various kinetic high-speed imaging sequences have been applied to examine anatomical and functional properties of deglutition. Due to artifacts MRI is of limited value in allowing exact measurements[25]. In a study by Hartl et al[26] dynamic MRI with single-shot fast spin echo was found to be useful for evaluation of the anatomical and physiological characteristics of swallow, however the temporal parameters could not be studied and motion artifacts made interpretation difficult.

Oesophagoscopy

It can be used to confirm or exclude neoplasia in patients who complain of thoracic dysphagia or odynophagia. Endoscopy has the advantage of obtaining histological diagnosis. Transnasal oesophagoscopy is an endoscopic examination of the oesophagus with an ultrathin flexible endoscope. It is a promising diagnostic modality in the assessment of dysphagia[27].

Electromyography (EMG)

It has been used to document function of the cricopharyngeal and strap muscles during swallowing. EMG activity of cricopharyngeal muscle is a very useful parameter for the diagnosis of neurogenic dysphagia objectively and quickly. They are important to understand the physiological mechanisms of deglutition and its disorders[28].

It is also indicated in patients with neurological disorders, such as polymyositis, myasthenia gravis or amyotrophic lateral sclerosis[29].

Manometry & Manofluorography

It involves the measurement of pressures generated in the pharynx and oesophagus. Manometry is used in the evaluation of the upper and lower oesophageal sphincters and oesophageal motility disorders. The most common manometric diagnoses are non-specific motor disorders secondary to reflux, and primary neurogenic motor disorders[21].

pH-metry

This is indicated when reflux is suspected. The use of a proximal oesophageal probe may help identify patients with laryngopharyngeal reflux[30].

Barium swallow

It is a widely available and popular test that can identify most anatomic causes of dysphagia and may indicate the presence of a motility disorder[31].

Conclusions

Dysphagia affects the quality of life of patients and may lead to dehydration, malnourishment and aspiration pneumonia. The social and psychological impact of dysphagia is severe and the condition is surprisingly underdiagnosed and undertreated[32]. Detailed history and examination together with undedated minimally invasive endoscopic, radiological and other investigations led by a multidisciplinary team is important for early diagnosis and management.

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