

ABSTRACT

Dysphagia is a common problem among the elderly either as a result of age-related loss of musculature and function involved in the act of swallowing, and/or because of neurological, degenerative, respiratory and musculoskeletal diseases that cause decreased swallowing function. Assessment for dysphagia is important to prevent serious complications such as aspiration pneumonia. Referral to the speech-language therapist for comprehensive assessment paves the way for proper management. The management may include diet modification, compensatory swallowing techniques, swallowing exercises or use of feeding tubes and facilitative devices.

Keywords:

Dysphagia, Aspiration, Aspiration Pneumonia

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INTRODUCTION

There is an increasing proportion of elderly in the local population. Correspondingly, dysphagia, or swallowing difficulty, has also become an increasingly common problem in the community. If dysphagia is not identified and managed adequately, it may lead to medical issues such as aspiration pneumonia that can be life-threatening.¹

What is dysphagia?

Dysphagia refers to difficulty in swallowing. It is common among the elderly due to age-related diseases and multiple medical conditions. Dysphagia puts elderly individuals at risk of choking, dehydration, malnutrition, and aspiration pneumonia. Patients may also experience frustration and/or depression as a result of their swallowing difficulty. The reduced ability in consuming drinks and food also impacts one's quality of life and should be taken seriously.

NORMAL PHYSIOLOGY OF SWALLOWING

To understand better what dysphagia is, we shall first take a look at the different phases involved in swallowing. Swallowing is a complex and coordinated neuromuscular process. It consists of both voluntary and involuntary activities. A normal adult swallowing process consists of three phases: oral, pharyngeal, and oesophageal (refer to Figures 1, 2 and 3). Dysphagia can occur at any of the three stages.

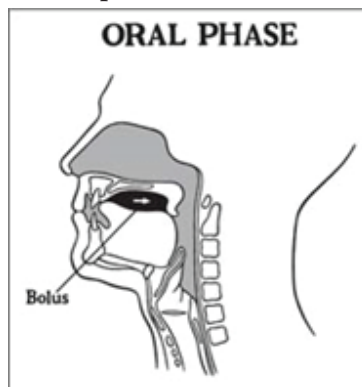
1. Oral phase

Figure 1: Oral phase of swallowing²

Food is moistened and chewed to form a bolus, and then the tongue moves the bolus to back of mouth and the oropharynx.

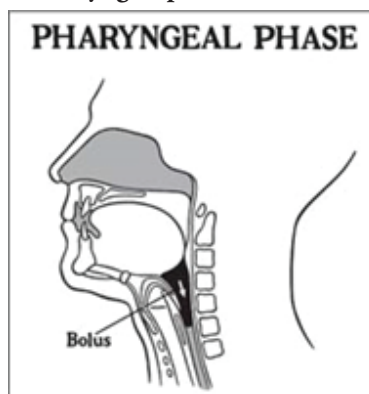
2. Pharyngeal phase:

Figure 2: Pharyngeal Phase²

As the bolus reaches the pharynx, special sensory receptors activate the involuntary part of swallowing, in which the larynx is elevated with temporary inhibition of breathing.

These neuromuscular events occur in the pharyngeal phase of swallowing:

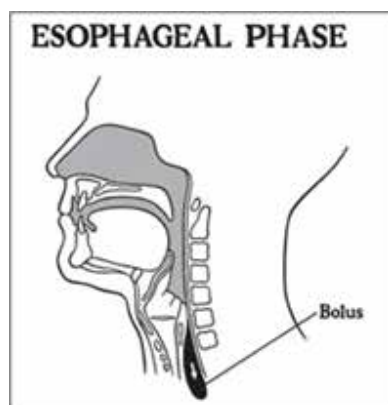
- a. Elevation of the soft palate to contact the posterior pharyngeal wall and keep the food bolus from regurgitating into the nasal cavity.
- b. Elevation of the larynx and hyoid bone toward the base of the tongue, resulting in a passive epiglottic retroflexion to close over the glottis, preventing food from entering the larynx and trachea.
- c. Contraction of the pharyngeal constrictor muscles that surround the throat, which tenses and narrows the larynx, with the adduction of the true and false vocal folds.
- d. Opening (relaxation) of cricopharyngeal sphincter (also called the upper oesophageal sphincter) to allow emptying of the bolus into the oesophagus.

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Figure 3. Oesophageal phase²**3. Oesophageal phase:**

The food bolus travels through the oesophagus by peristalsis to the stomach.

PATHOPHYSIOLOGY OF DYSPHAGIA**1. Oral phase dysphagia**

Patient may have difficulty in

- retrieving liquid/food from the spoon/straw,
- controlling and manipulating food and liquids in the mouth,
- forming a cohesive bolus mixed with saliva, and /or
- propelling the bolus into the throat.

It can be a result of dental and jaw problems, weakness and incoordination of the tongue, and/or reduction in labial and buccal muscle tension and tone. Other physiological changes such as reduced fine motor control, decreased taste and smell, and reduced salivation can be contributing factors.

2. Pharyngeal phase dysphagia

This is characterised by difficulty in initiating a swallow, and /or transferring of food bolus or liquid from the oral cavity to the oesophagus. The patient may encounter a problem in any of the sequential steps during the pharyngeal phase of swallowing as described above. The common causes of dysphagia in this phase are neurological disorders such as stroke, motor neuron diseases such as Parkinson's disease, and dementia. Dysphagia can also be associated with anatomical issues with the head or neck, in cancers or pharyngeal diverticula.

3. Oesophageal phase dysphagia

This refers to swallowing problems in the oesophagus characterised by the sensation of food being stuck in the oesophagus or chest. This is usually due to mechanical obstruction or disordered peristaltic mobility. Some of the common causes include achalasia, gastroesophageal reflux disease (GERD), oesophageal tumours and inflammation, fibrosis and/or scarring of the oesophagus as late onset side effects of irradiation therapy.

COMPLICATIONS OF DYSPHAGIA

Complications of dysphagia include malnutrition, dehydration,

choking and aspiration pneumonia. Aspiration of food has a higher association with aspiration pneumonia than aspiration of fluids.³

Aspiration refers to the misdirection of secretions, food particles or gastric contents into the larynx, entering the airway below the level of the true vocal folds. **Silent aspiration** refers to aspiration without any cough reflex or overt signs of swallowing difficulties.

Aspiration can occur before swallowing with spillage of materials into the hypopharynx and into the airway due to delayed initiation of swallowing or reduced tongue control. It can also occur during swallowing when hyolaryngeal excursion is weakened or delayed. Consequently, there may be delayed, weakened, or incomplete retroflexion of the epiglottis. Even after swallowing, the patient may aspirate from the residue left in the pharynx when the swallowing is ineffective, or from reflux of materials from the oesophagus (Figure 4).

Hence, early detection of dysphagia is crucial for immediate and appropriate intervention and management.

**Figure 4:** Aspiration of food or fluid particles.⁴**SYMPTOMS OF DYSPHAGIA**

A healthcare worker may suspect dysphagia if a patient or his/her caregiver reports the following account of symptoms (Table 1).

ASSESSMENT OF DYSPHAGIA**A. Assessment in the doctor's consultation room****i. History and examination**

The approach to assessing whether a patient has dysphagia starts with appropriate history taking and physical examination. Bear in mind the possible causes of dysphagia, and the possible presenting symptoms and signs of dysphagia in order to ask relevant questions (refer to Tables 2 and 3).

ii. Simple screening test for dysphagia in the clinic:

The 3-ounce water swallow test:

The 3-ounce water test is used as a dysphagia screening for stroke patients but it is also commonly used among geriatric patients.⁵ Patients who already have a known previous history of dysphagia, aspiration, or a brain stem stroke would be excluded. During the screening test, patients are preferably seated up, and then asked to drink 3 ounces (90cc) of water without interruption, either by straw or cup. However, if the individual is observed to be drowsy or unable to control his/her saliva, the screening test should be deferred. During the water

Table 1: Common symptoms of dysphagia

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| <p>Common symptoms of oral and pharyngeal dysphagia (oropharyngeal dysphagia):</p> <ul style="list-style-type: none"> - Difficulty initiating swallowing - Anterior leakage of food or fluids / drooling - Food residue in the mouth - Coughing or choking with swallowing - Wet or gurgly voice quality after swallow - Food sticking in the throat - Frequent throat clearing during mealtime - Nasal regurgitation - Multiple swallows required for one small bolus of food - Increased breathing rate during/after feeding |
| <p>Common symptoms of oesophageal dysphagia:</p> <ul style="list-style-type: none"> - Sensation of food sticking in the chest or throat - GERD – heartburn, sour regurgitation, belching, water brash |
| <p>Signs common to both oropharyngeal and oesophageal dysphagia:</p> <ul style="list-style-type: none"> - Unexplained weight loss - Nutritional deficiency - Recurrent pneumonia |

Table 2: Common causes of dysphagia

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| <ol style="list-style-type: none"> 1. Neurologic disorders (e.g., stroke, degenerative diseases) 2. COPD or other respiratory diseases, presence of a tracheostomy tube 3. Disorders of the head, neck or oesophagus 4. Drug-induced dysphagia: e.g. , anticholinergic agents, medication that causes central nervous system depression or leads to dry mouth (e.g. , diuretics, Prozac). 5. History of specific treatment (e.g., chemotherapy, irradiation) |
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Table 3 : Questions doctors can ask the patient and/ or his caregiver when dysphagia is suspected:

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| <ol style="list-style-type: none"> 1. Do you ever cough or choke during meal time or when drinking? 2. Have you lost weight for no good reason? 3. Do you have difficulty taking your medication? 4. Do you have difficulty in swallowing or chewing certain foods? 5. Do you feel any food stuck in your throat? 6. Do you have difficulty clearing the food from your mouth or throat with one swallow? 7. Does your voice sound wet or “gurgly” when you are eating? 8. Are you taking a longer time finishing your food, or have problem consuming a whole share of meal? 9. Do you have repeated episodes of pneumonia and/or respiratory problems? 10. Do you have sudden onset of swallowing difficulty? |
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swallow test, if the patient stops, coughs, chokes, or shows a wet-hoarse vocal quality during the test or for one minute thereafter, it is deemed that they have failed the test. Putting patients nil by mouth till further assessment by a therapist may be required.

If dysphagia is suspected, a timely referral to a speech-language therapist (SLT) for swallowing assessment, and a possible further instrumental swallowing assessment is needed. Family doctors can refer patients to restructured hospitals, local private speech therapists or swallowing clinics. To access local SLT services in Singapore, doctors can access the website of the Speech-Language & Hearing Association Singapore for more information.⁶

B. Formal assessment of dysphagia by speech-language therapist (SLT)

Besides working with children or adults with speech, language and communication problems, the speech-language therapist (SLT) is specialised in assessing and treating people with swallowing difficulties. A Clinical Swallowing Evaluation (CSE) performed by speech therapists involves three components:

I. Clinical Swallowing Evaluation (CSE)

i. Patient History

Evaluation of a patient's history is a necessary precursor of the Clinical Swallowing Evaluation (CSE). It includes:

- Patient's symptoms, past and current medical history, any previous swallowing assessment, socio-cultural status, and patient's support and living situation.
- Information pertaining to onset, frequency, progression of the symptoms, appetite and weight loss.

ii. Physical examination

Upon first encounter, the SLT immediately begins to make observations of the patient's mental status (level of alertness), nutritional status, functional status (whether the patient is mobile or bedbound), and respiratory status. If indicated, precautionary steps and adjustments would be made (e.g., provide support for head control and sitting, monitor pulse oximetry and respiratory rate) before the assessment is conducted.

Next, the SLT would proceed to assess the patient's ability in following simple instructions, his cognitive function and oral motor skills.

Assessing the oral motor and laryngeal function provides information regarding the involvement of specific cranial nerves V, VII, IX, X, and XII, that are critical for swallowing. The integrity and movement of the structures involved in swallowing (e.g., lips, tongue, jaw and soft palate), articulation precision, resonance, voice quality and strength in volitional cough would be evaluated.

Additionally, it is important to observe the patient's ability to

manage oral secretions and to find out if there is any change in taste, smell, oral health and dentition, especially in elderly patients. If needed, oral hygiene would be performed before proceeding to oral trials. There is strong evidence for an association between poor oral hygiene and respiratory pathogens.⁷

iii. Trial swallow

Not all patients are good candidates for trial swallows especially those with reduced mental status, respiratory distress or no initiation of dry swallow. If the patient is deemed safe, one can proceed to conduct a trial swallow with food of a variety of bolus sizes, consistencies, temperature and modes of feeding. However, the trial should be discontinued if signs of problems arise, which indicate that the risks outweigh the benefits of the assessment. Adjuncts to the CSE can include cervical auscultation to listen to the swallowing and breath sound during and after the swallows, and/or SpO₂ level monitoring. The patient's ability to feed himself, level of assistance needed, feeding rate, ability in maintaining posture and strength should be noted, as well as any signs of fatigue. All these can be best observed as a patient takes a meal. It has been found that the level of the patient's dependence on the caregiver for feeding and oral care is significantly related to the risk of pneumonia.¹ Through a comprehensive evaluation of dysphagia, the SLT would be able to determine a patient's ability to safely take food and liquid that will meet his or her nutrition and hydration needs, without compromising his or her safety.

However, there is some limitation in predicting aspiration and making a diagnosis of the physiology of dysphagia in clinical swallowing assessment. Referral for further diagnostic assessment tests may be required for patients at risk of silent aspiration.

II. Diagnostic tests

i. **A videofluoroscopy (VFS)**, or modified barium swallow, is one of the golden tools in assessing a person's swallowing ability and identifying exactly where the problem occurs. During the investigation, patients will be asked to swallow different types of food and drink of different consistencies mixed with barium, in the presence of a speech therapist and a radiologist. From a lateral view (aspiration is best detected) and an anterior-posterior view (to observe swallow symmetry and vocal function), a VFS allows us to see through the mouth and the throat to identify if food / liquid is going into the airway and possibly detect the underlying physiology of the swallowing problems. This test video-images a) if the patient has silent aspiration; b) whether a cough is effective in ejecting aspirated particles; c) what kinds of food are safest to swallow; and d) strategies/positions that may help the patient to swallow better. Provision can be made for extended imaging of the food bolus passing through the oesophagus when oesophageal phase dysphagia is suspected.

Figure 5: Fluoroscopic imaging of swallowing study taken with the lateral view, when the bolus was kept in the oral cavity sealed by the base of the tongue and the soft palate posteriorly (arrow).⁸



ii. Fiberoptic Endoscopic Evaluation of Swallowing (FEES) is an instrumental evaluation of swallow which can be safely performed at the bedside. A flexible endoscope is passed through the nose, usually by an SLT or Ear, Nose and Throat (ENT) surgeon. It provides diagnostic swallowing evaluation for patients with swallowing deficits through direct observation of:

- anatomy and movement of pharynx, and laryngeal function;
- secretion management; and
- sensory status of the larynx /pharynx.

During the procedure, different food consistencies such as fluids and solid (e.g., bread) mixed with blue dye are used to evaluate swallowing. The endoscope is manoeuvred in situ to maximise visualisation of a) the critical structures of swallowing; b) the amount of secretion; c) the presence of any pharyngeal residue; d) aspiration into the larynx; and/or e) effectiveness of cough (if elicited). FEES provides useful information for the diagnosis of pharyngeal phase dysphagia and allows instant biofeedback/therapy for any compensatory strategies or manoeuvres. This enables the SLT to make recommendations for safe and efficient swallowing.



Figure 6: Fiberoptic Endoscopic Evaluation of Swallowing (FEES)⁹

MANAGEMENT OF DYSPHAGIA

What can be done to help patients with dysphagia?

A. Modification of diet/fluids consistencies

For patients with mild to moderate dysphagia, modification of a diet and fluids that are easy and safe to consume may be recommended as a compensatory strategy. Some people may

need to have their food puréed and drinks thickened. Solid and fluid modification includes:

- Thickened fluid (from nectar, honey to pudding thick consistency); and
- Modified diet consistencies: Finely chopped (easy chewing diet), finely minced (soft moist diet), and blended diet with no chewing required.

Use of the above modifications may enhance pulmonary safety. However, a modified diet consistency may reduce an elderly's pleasure in eating and, consequently, his consumption of food. For similar reasons, patients on thickened fluids are also at risk of dehydration. Hence, the patient's nutritional adequacy and his / her assurance of quality of life must also be considered.

B. Swallowing compensatory strategies

Besides diet modification, there are different **head positions and swallowing strategies**, aimed at reducing the risk of aspiration or improving pharyngeal clearance. Postural strategies (e.g., chin tuck, head tilt, head rotation and side lying) and bolus control techniques (e.g., 3-second preparation, lingual sweep, double swallows, cyclic ingestion) may be recommended as compensatory strategies if the elderly can follow instructions and apply the strategies during meal times. Besides reinforcing the above strategies, supervised feeding to monitor feeding rate and control bolus size may be required.

C. Rehabilitative swallowing exercises

Rehabilitation of swallowing aims to improve the physiology and efficiency of swallowing, so that patients can progress from non-oral feeding to oral feeding, or progress from a modified texture to a more normalised diet and fluids consistency. Examples of these swallowing exercises are:

- Oral/facial exercises to improve range of motion and strength;
- Vocal adduction exercises;
- Breathing exercises;
- Pharyngeal strengthening exercises;
- Head-lifting manoeuvre; and
- Controlled bolus practice.

D. Facilitative techniques and prosthetic devices

Some patients may benefit from thermal tactile stimulation (TTS) to increase sensation and swallow initiation. Prosthetic devices such as palatal lifts (for weak tongue or soft palate) or dentures assist in better control and manipulation of the bolus intra-orally.

E. NG tube feeding and PEG

In some cases, if a person cannot eat by mouth, or is unable to have adequate oral intake to meet his nutrition and hydration needs, enteral feeding (bypassing the oral and pharyngeal phase) would be considered. An example of enteral feeding is Nasogastric tube feeding (NGT), where a tube is inserted via the nasal cavity and down the throat for conveying feed supplements and fluids into the stomach. When patient safety is not significantly compromised, some patients with tube feeding may be allowed to take small amount of clear water or thickened

fluids at the same time, in order to maintain some quality of life. It is also to maintain whatever limited swallowing function the patient may have in the hope of ongoing/future rehabilitation. Some patients may also benefit from swallowing exercises and regular swallowing review by the SLT for potential weaning off of the NGT. However, if the swallowing problem is severe and the patient requires a longer-term option of tube feeding, Percutaneous Endoscopic Gastrostomy (PEG), in which a feeding tube is surgically inserted into the stomach directly, through the abdominal wall, may be suggested. One thing to keep in mind is that tube-feeding does not eliminate risk of aspiration, as the patient may still be at risk of reflux of stomach contents. Hence, it is important to sit the patient upright as much as possible for about 30 minutes after tube feeding.

F. Training of caregivers

Often, a patient with dysphagia is dependent on a caregiver for his feeding needs, from preparation of the food of specified consistency to administration of the NGT feeds. Therefore caregiver training constitutes a very important part of the management of dysphagia. *Safe feeding* techniques must be reinforced at all times. Below are some tips for aspiration precaution:

1. Sit patient upright in a chair, or prop patient up on the bed as close to 90 degrees as possible.
2. Provide support for the head to remain upright and slightly forward during feeding.
3. Feed only when patient is alert.
4. Monitor the rate of feeding and the sizes of bites/bolus.
5. Ensure correct consistency of fluids and food served, including serving of medication/side dishes gravy.
6. Check if there is any gurgly or wet voice quality after swallow. Prompt the person to clear throat or cough if needed and double swallow.

According to the Geriatric Oral Science Project (GOSP) by Susan Langmore,¹⁰ besides dysphagia, five leading causes of aspiration pneumonia among the elderly were identified as dependent feeding, dependent oral hygiene, missing teeth, multiple medications and tube feeding. It is crucial to educate and train caregivers to maintain good *oral care* for the elderly, as good oral care may reduce pneumonia in tube-fed individuals.¹¹ This is because the volume of bacteria in the mouth grows exponentially in patients unable to clean their oral cavities. Routine oral care reduces the potential for aspiration of bacteria from one's own secretion. Simple oral care including daily tooth

and tongue brushing using a sponge brush and moisturising of dry mouth with an artificial moistening gel or spray should not be neglected.

CONCLUSION

The prevalence of dysphagia increases with age, as the elderly may have loss of muscle mass, missing teeth, or reduced coordination of oral musculature movement. Family doctors can play an important role in early identification for a timely referral to a speech language therapist. Further evaluation and appropriate treatment can maximise the patient's potential for improvement in swallowing. It also reduces the risk of secondary complications such as aspiration, thus minimising potential social and medical costs.

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LEARNING POINTS

- **Dysphagia is an increasing multifactorial problem in a rapidly ageing population.**
- **Patients who cough or choke while eating or who have frequent respiratory and chest infections, poor nutritional status and unexplained loss of weight should be assessed for dysphagia.**
- **Family doctors can play an important role in early identification of dysphagia.**
- **The patient suspected of having dysphagia should be referred to the speech language therapist for proper assessment of his swallowing ability.**
- **Modification of diet and fluids, as well as compensatory strategies involving eating posture can help patients with dysphagia.**