# Case study of nutritional management of a patient with a swallowing disorder

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## INTRODUCTION

Cases of patients presenting with unexplained pneumonia, dysphagia and progressive weight loss have been increasing in practice. Many are thought to be linked to swallowing disorders, which have been under diagnosed in practice. Patient A M presented in February of 1999 to Age Related Healthcare in Tallaght Hospital with a history of poor oral intake, dyspnoea and dehydration and was documented to have a swallowing disorder, which was treated resulting in a complete recovery within a month.

This case review aims to document the integrated role of the dietician, speech therapist and medical staff in the treatment of patient A M and will include a short review of the causes of swallowing disorders and approaches to nutritional management of these cases.

## CASE STUDY

Patient A M, an 85 year old widow from Dublin presented through Accident & Emergency to the Age Related Health Care Centre at Tallaght Hospital on 2/2/99 complaining of a 5 day history of dyspnoea, shivering, nausea, anorexia and vomiting.

Of note, in her past medical history, she had a history of transitional cell carcinoma of the bladder, diagnosed in 1989. She also had a history of chronic obstructive airways disease and osteoporosis with collapse of thoracic and mid-lumbar vertebrae. Socially, she lived alone and was an ex-smoker.

On examination, she was afebrile, tachypnoeic with cyanosis and in sinus tachycardia. Her jugular venous pressure was raised and had decreased breath sounds bilaterally with an expiratory wheeze heard throughout both fields and coarse crackles in her left lower base. No focal neurological signs were present. Cognition was intact with an abbreviated mental test score of 8/10. She was independent of walking, dressing, shopping and cooking.

The results of her investigations were as follows: raised white cell count at $15.1 \times 10^9$ /L, predominant neutrophilia; Hb was 11 g/dl. Renal function tests showed a raised urea of 19.2 mmol/L and raised creatinine levels at 235 µmol/L. Her albumin was decreased at 34 g/L, an arterial blood gas measurement was consistent with type II respiratory failure with a pH of 7.36, $P_{CO2}$ of 6.8, a $P_{O2}$ of 4.3, $O_2$ saturation at 56% and $HCO_3^-$ of 27.

Her chest X-ray showed an increased cardiac size, bibasal pulmonary congestion and left lower lobe infiltrative changes.

She weighed 51 kg on admission.

***Management***

A preliminary diagnosis of pneumonia on a background history of chronic obstructive airways disease was made. Antibiotic treatment was commenced for a lower respiratory tract infection, with supplemented $O_2$. She was referred for multi-disciplinary assessment including physiotherapy, speech therapy, dietetics and occupational therapy.

Initial assessment by the speech therapist revealed a swallow disorder with aspiration of fluids. The patient was put on nil per oral (NPO) and further video fluoroscopic studies were ordered along with dietetic assessment. The initial recommendation after swallow assessment was that the patient should be given nasogastric feeds. However, the team was unable to pass the nasogastric tube despite several attempts as the patient became distressed on every attempt.

In view of this, the speech therapist and nutritionist then recommended a trial of set foods and fluids. After consuming set fluids the patient coughed intermittently and experienced shortness of breath with an increased rate of respiration. With set food, in this case set yoghurt, there was intermittent throat clearing, with a mild increase in respiratory rate

***Table 1**: Energy needs of patient AM*

| **Females over 60 years:** |
|---|
| 9.0 (wt in kg) + 656 = 1115 kcal (pt reported weight as 51 kg) |
| x 10% Activity Factor (bed-bound, immobile) |
| x 10% Stress Factor (increased white cell count) |
| = 1533 kcal minimum |

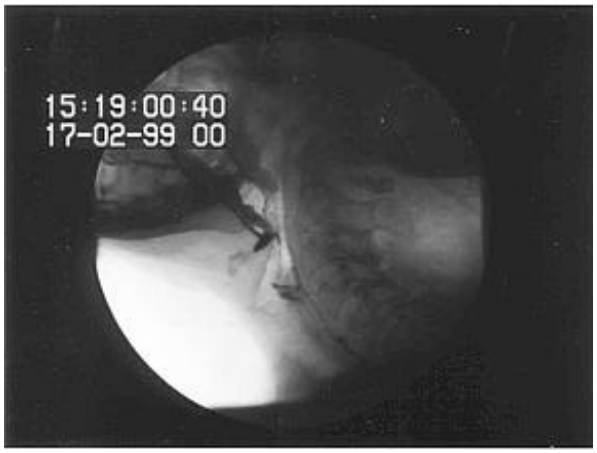


***Fig 1**: Sip of water with poor control of fluid in mouth due to poor tongue control. Fluid spills prematurely into pharynx before swallow reflex is triggered.*

and no cough. It was decided to continue the patient on this with close clinical monitoring.

Energy requirements for the patient were calculated based on the Schofield Equation as shown in Table 1.

The patient's oral intake was monitored daily by the dietician. She consistently failed to meet her energy requirement, and was averaging an intake of less than 500 kcal per day. Furthermore nursing staff noted that she continued to cough after eating. Four days into the trial of oral feeding the patient's respiratory status deteriorated. Her respiratory rate increased to 26 breaths per minute, on auscultation diffuse coarse crackles were heard and her $O_2$ saturation levels dropped from 82% to 70%. A diagnosis of aspiration was made. Another attempt at passing a nasogastric tube was unsuccessful. On consultation with the dietician, it was decided that the patient should be commenced on total parenteral nutrition via a peripheral line. Oral feeding was stopped and the patient was counselled about the need for parenteral nutrition.

Nutritional requirements for the patient on total parenteral nutrition based on a weight of 51 kg were calculated and are summarised in Table 2.

Vitrimix was suitable for peripheral administration because of its low osmolality.

The parenteral feeding regime comprised of 1.5 L Vitrimix delivered over 24 hr at 65 ml/hour. The regimen provided a total of 1458 kcal. Vitrimix (osmolality 1130 mosm/kg) was infused for three days but the intravenous line was infiltrated and failed on three occasions, this is a common problem with Vitrimix infusions. A patient specific parenteral feed was ordered from the hospital pharmacy on 15/2/99. This regimen was fortified by the addition of trace elements and vitamins and its composition is outlined in Table 3.

***Table 2**: Nutrition requirements*

| | |
|---|---|
| Energy: | 1533 kcal |
| Protein: | 51-63 g (1-1.25 g/kg) |
| Carbohydrate: | 220-367 g (3-5 mg/kg/min/d) |
| Fat: | 51-70 g (1-1.5 g/kg/d max) |
| Na: | 51-70 mmol (1-1.5 mmol/kg/d) |
| K: | 52 mmol (5 mmol/g Nitrogen/d) |
| Fluid: | <1530 ml (<30 ml/d) |

***Table 3**: Breakdown of Patient Specific Parenteral feed.*

| | |
|---|---|
| Na | 46 mmol |
| K | 34 mmol |
| Mg | 6 mmol |
| Ca | 3 mmol |
| phosphate | 13 mmol |
| Zn | 100 μmol |
| carbohydrate | 130 g |
| lipid | 70 g |
| non-protein | 1150 kcal |
| 9.6 g N: | 60 protein |
| trace elements | |
| fat-soluble vitamins | |
| water-soluble vitamins | |

Swallow function was monitored regularly and clinically no improvement was evident. Videofluoroscopy was repeated on 17/2/99 and it showed that there was penetration and intermittent aspiration with all consistencies tested; penetration towards the airway was more severe as consistency thickness increased. There was also significantly increased oral transit time and bolus preparation time (10 seconds per bolus). Pooling of food in the pharynx prior to swallowing was increasingly delayed as consistency thickness increased.

The swallowing dysfunction was due to poor formation of food bolus in the mouth causing premature spillage into the pharynx, and intermittently into the airway, before the second swallow was triggered. There was also reduced

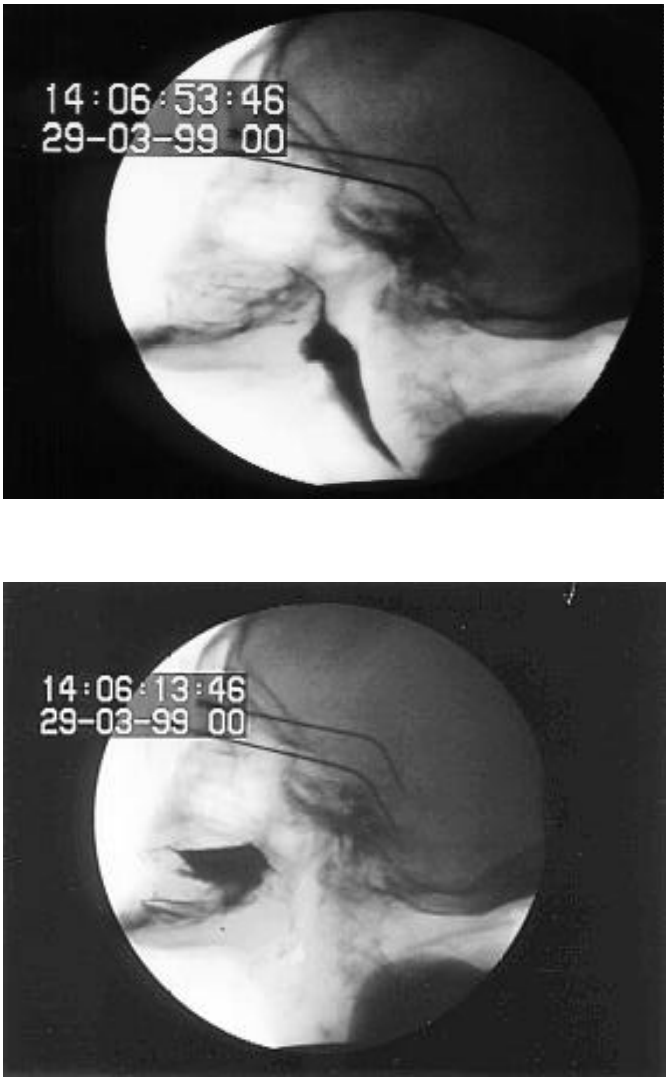


***Figure 2:*** *Sip of water* ***(a)*** *– Improved bolus hold in mouth. Better tongue control.* ***(b)*** *– During the swallow, no premature spillage, prompter swallow, and reflex triggered faster than initial study.*

lingual control/tongue weakness, especially of the posterior tongue and poor pharyngeal sensation with a delayed oral phase.

Parenteral feeding was continued and the patient was monitored by daily urinalysis and glucometry and twice weekly phosphate and magnesium levels. Liver function tests were performed weekly as TPN can adversely affect hepatic function.

The speech therapist commenced compensatory and direct therapy with the patient, attempting to improve swallow function. This therapy focused on supraglottic swallow technique, tongue bolus control and manipulation exercises. Given the recurrent problems with the peripheral line and the physiological advantage of enteral feeding it was decided to make a further attempt at nasogastric tube insertion, failing a central venous line insertion would be recommended.

A nasogastric tube was inserted on 19/2/99 (17 days post admission). Nasogastric feeding commenced slowly in order to prevent aspiration. The patient was started on a standard enteral feed (1 kcal/ml) at 30 ml/hour for the first 4 hours, then 60 ml/hour for 4 hours, followed by 85 ml/hour for the next 10 hours. At this point the patient's weight was 46 kg.

On Day 2 of NG feeding, the delivery rate was maintained at 85 ml/hour for 18 hours. This provided 1500 kcal, 60 g protein, 59 mmol Na and 57 mmol K in a total volume of 1.5 L over 24 hours.

The feeding regimen was altered on 22/2/99 when the patient complained of constipation. She was commenced on a fibre containing enteral feed. As she was now mobile on the ward her energy requirements were increased and requirements were re-assessed as follows:

Basal energy requirements 1500 kcals x 15% Activity Factor = 1725 kcal.

The patient was also commenced on solids with the speech therapist during swallowing exercises. Therapy included tongue exercises, tongue icing and exercises in swallowing. The patient was encouraged to follow specific commands such as 'Head back, hold breath, and take a strong swallow and cough.' The patient was taught how to do her own swallowing exercises. It was felt at this point that the patient's stamina was increased and that she was clinically improved.

The patient thrived on this programme. Her weight had increased to 48.6 kg by the 26/2/99 (24 days post admission) and continued to improve to 49.4 kg by the 10/3/99 (36 days post admission). She began to tolerate a soft/semi-solid diet and the nasogastric feeds were gradually tapered down to overnight feeds as her oral intake improved.

The nasogastric tube was removed on 23/3/99 (49 days post admission) and the patient went for a home visit with the occupational therapist. The dietician commenced the patient on oral nutritional supplements.

The patient underwent a repeat videofluoroscopy on 29/3/99 (55 days post admission). The videofluoroscopy showed significant improvement from her last study with much better bolus preparation and clearance from the mouth/pharynx. There was no aspiration observed and only mild intermittent penetration towards the airway. This was maximal with sips of fluids and slow moving fluids resulting in intermittent throat clearing. These were due to a mild swallow reflex delay and tongue in coordination possibly linked to a sensory deficit.

She continued to steadily improve and was discharged home on the 6/4/99 (63 days post admission) on a semi-solid diet with nutritional supplements.

## Summary

In summary this patient had a stay of 63 days in hospital from 2/2/99 till 6/4/99. Her initial problem was an aspiration pneumonia for which she was commenced on a NPO regime and treated with

antibiotics. She was diagnosed with swallow disorder and was maintained on peripheral parenteral nutrition and nasogastric feeding until she could safely swallow. The speech therapist and dietician assisted this lady improve her swallow function by an integrated programme of swallow exercises and diet consistency modification.

Overall, the patient had a very successful recovery, progressing from dysphagia to total enteral feeding within a month. This case illustrates the multidisciplinary approach necessary to manage swallow disorder.

## Review

Feeding and swallowing problems can occur at any age but are particularly prevalent in the elderly. The morbidity and mortality as well as the costly disability and dependence that result from an impairment in oral intake are now being recognised as major geriatric health problems. Aspiration is the most significant clinical sign. When the airway is unprotected and foreign material is aspirated into the lungs, the person is at risk for development of pulmonary infection and aspiration pneumonia, the fifth leading overall cause of mortality in the United States and the fourth most frequent cause of death in the elderly.[1]

### *Aspiration*

Aspiration can be broadly defined as the misdirection of oropharyngeal contents into the larynx, immediately before, during, or after the act of swallowing. In normal swallowing, penetration occurs more often than aspiration.[2] This does not result in coughing or other visible or audible laryngeal reaction. In contrast, the reaction to aspiration is normally a cough. Most individuals aspirate a small amount of oropharyngeal contents during sleep.[3, 4] Materials that enter the larynx may pass further into the trachea and lungs, depending on their physical characteristics, the functional status of the cough reflex, and the efficiency of mucociliary action of the respiratory epithelium. The more liquid or fluid the substance, the more likely it will be aspirated and travel further into the respiratory system.

### *Causes*

Degenerative changes of aging often result in marginally compensated deglutition.[5] When common neuromuscular diseases affect the elderly, oral intake impairment may present and progress differently than in younger individuals. Dysphagia secondary to acute stroke is less common than progressive dysfunction due to multiple prior strokes. Parkinson's disease may continue to affect deglutition adversely even when other motor symptoms are well controlled with medication. Aspiration was more commonly associated with debilitation, dementia and depression as opposed to specific neuromuscular disorders.[6]

Decreased levels of alertness, psychomotor retardation, anorexia and psychosocial isolation considerably reduce oral intake and may result in deconditioning. Psychoactive medications may also contribute or cause such impairment. Although hypoxic and metabolic encephalopathy may contribute to this syndrome, focal neurological changes are not present. Gastroesophageal reflux probably occurs more often because of the patient's bedridden state. Tumours affecting deglutition are uncommon causes. Large cervical osteophytes or hyperostosis are common structural abnormalities associated with aging. Such bony masses may prevent inversion of the epiglottis or displace the laryngopharynx and alter biomechanical forces.

Reduced gag or cough reflexes are the rule in the elderly and the senescent laryngopharynx often cannot respond appropriately to retrograde bolus flow.

Other associated predisposing factors include smoking, atherosclerosis, a decreased level of alertness, reduced immunity and lung clearance, and bed-ridden existence.[7]

### *Management*

Dysphagia is diagnosed and treated by a multidisciplinary team including a radiologist, speech therapist, dietician and nurse.[8] The speech therapist and radiologist work together to diagnose the location and reason for the problem, utilizing videofluoroscopy. Treatment may focus on improving the patient's oral motor status for swallowing, retraining the patient in feeding skills, planning diets, assessing the patients calorific and fluid intake levels, and providing alternative means of nutritional support.

Some symptoms of dysphagia can be seen or heard and are usually detected by the nurse. Symptoms may occur at any time in the act of swallowing. In the oral preparatory phase, symptoms may include drooling, failure to drink from a cup, failure to chew, or intolerance of textures. In the oral phase, symptoms may include stasis in the oral cavity or pocketing of food. In the pharyngeal phase, symptoms may include gagging, congestion, coughing, audible breathing and a gurgly or hoarse voice. In the oesophageal phase, symptoms may include vomiting, reflux or pain.

The management of deglutitive aspiration begins with the definition of the anatomic or physiologic aetiology of the aspiration. This usually involves a radiographic study of the oropharyngeal region during swallow of specified bolus types. Aspiration may result because of reduced tongue based movement, unilateral pharyngeal wall weakness, bilateral pharyngeal wall damage, reduced anterior or vertical laryngeal movement, reduced closure of the laryngeal entrance or reduced cricopharyngeal opening.[9]

Videofluoroscopic studies help define the aetiology of the aspiration disorder and include the introduction of selected treatment strategies to eliminate aspiration. These strategies usually begin with postural changes, which potentially change the dimensions of the pharynx and the direction of food flow without increasing the patient's work or effort. These are effective in eliminating aspiration in 70-

80% of patients, including children and some patients with cognitive and language impairments.[10]

If postural therapies are not helpful, swallowing therapy procedures include swallowing manoeuvres, sensory input, and exercise programs, which may eliminate the aspiration immediately or, gradually with therapy.

Each patient requires individualised treatment depending on the anatomical and physiological reasons for dysphagia. Treatment may focus on eating style, posture, oral motor techniques, or adaptive equipment. Attention must also be paid towards nutrient-drug interactions that may interfere with the swallowing treatment. Patients who are unable to maintain adequate nutrition safely by mouth may be tube fed while undergoing treatment to improve their swallowing status.

## Dietary Management

Two main concerns in the dietary management of the dysphagic patient are to maintain adequate nutrition and to ensure safety during oral feeding. The ultimate goal is to train the patient to select the proper foods and use the recommended swallowing techniques with the aid of videofluoroscopy.[11]

Standard hospital diets are served with liquids. Dysphagic patients require modifications of these diets. Kitchen and nursing staff must remove from standard diet trays solid foods and liquids that pose swallowing hazards. For example, thin liquids, such as water, juices and coffee are often the most difficult to swallow. Some patients have difficulty manipulating, swallowing and clearing thick liquid texture such as milk shakes and honey. Other patients may have problems with foods that are dry, chewy, crispy or stringy.

Several issues emerge in the literature concerning the dietary management of dysphagia. These include the food's taste, temperature, consistency and potential to stimulate mucus production.

***Taste***

Strong flavours such as sweet, spicy, sour or salty tastes may stimulate salivation, swallowing or mastication.[12] Bland flavours should be avoided.[13]

***Temperature***

Food should be served at hot or cold temperatures rather than tepid or at room temperature to stimulate the swallowing response.[14] Specific recommendations for cold foods include ice chips and ice cream, if tolerated to provide sensory input. Exceptions, however, must be made for patients with decreased oral sensation. For those patients, food should be served tepid or at room temperature to minimise the burning or numbing of oral structures.

***Texture***

Liquids should be thick; foods that form a bolus in the mouth are easier to swallow. Patients should avoid foods that are crumbly or fall apart in the mouth.[15] Density and shape are important as well. Most researchers agree that Jell-O slips down easily. Applesauce may be difficult, as it does not maintain a cohesive bolus in the mouth. Foods such as canned fruit, Jell-O and ice chips may be easier for some patients to manage. The choice of such foods is an individual decision based on the patient's capabilities.

***Consistency***

Easy to chew does not mean easy to swallow. A dysphagia diet can progress from the most to least restrictive foods. Semisolids such as soft peaches, oatmeal and thickened pureed fruits are easy to swallow since they hold their shape in the mouth and stimulate swallowing. Liquids are usually more difficult to swallow than solids since they do not provide as strong a stimulus as solid foods. Water is usually the most difficult to control; it runs into corners and down the throat. Liquids such as gravy and juices can be used to moisten dry foods. All researchers agree that liquids and foods should be presented separately. Never use a fluid to 'wash the bolus down'.[16] Two different consistencies can send confusing stimuli.

***Mucus Production***

Problems with excess and inadequate saliva production should be addressed. The elderly, for example, show decreased salivary production. All researchers agree that milk products tend to form excess mucus that can be difficult to clear and swallow. Chocolate may stimulate secretions in some patients. Broth and meat juices, however, can thin mucus secretions. Wellnetz[17] suggested adding yoghurt, cheese and cottage cheese to the meal if milk products increase mucous production.

## Conclusions

The importance of correct food consistency, texture and temperature cannot be underestimated and are important for the patient's success during treatment. All three factors are important, they act to heighten lingual control, reduce oral muscle fatigue, minimise the patient's fear of choking, and provide a cohesive bolus to sensorially stimulate a swallow reflex.

A dysphagia diet is intended to use foods that stimulate swallowing and minimise mucus build-up around the larynx. Dysphagia may lead to malnutrition and dehydration and at the most severe stages can cause choking, aspiration and airway obstruction. Therefore it is imperative to deal with the dangers of dysphagia through dietary management once the other therapeutic techniques have been instituted.

The needs of the dysphagic patient vary widely. Self-feeding is an important aspect of self-care. Insecurity about eating and fear of choking especially in public can be humiliating. Independent feeding has a considerable impact on self-esteem.

In the acute care setting or nursing home environment, there will be patients for whom the treatment options described above are insufficient. When significant aspiration is detected and is not amenable to treatment, tube feeding must be considered. Since the swallowing evaluation is the

best means of determining the patient's physiological ability to swallow safely, one of the major considerations for PO/NPO feeding rests with the findings from this examination.

Other factors to consider include the patients overall risk for developing pneumonia. If the patient is bedridden with poor pulmonary clearance and has a depressed level of consciousness, the decision to make him or her NPO is strengthened. In contrast, if the patient is active and ambulatory, an NPO decision might not be advisable.

Quality of life issues need to be raised as well as the patient's and their family's wishes. Sometimes the transition to tube feeding may be partial with patients continuing to eat small amounts of pureed food or liquid for pleasure but continuing to sustain themselves nutritionally via tube feedings.

Management of dysphagic patients is a challenge for medical practitioners. The problem calls for multidisciplinary interaction and coordinated treatment goals.

## Acknowledgements

I would like to thank Zelda Farrell, Senior Speech and Language Therapist, Tallaght Hospital and Aine Kennedy, Clinical Dietician, Tallaght Hospital for all their help with literature and advice for this essay.

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