

## Behavioural Intervention

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Received: January 31, 2014

Revised: July 9, 2014

Accepted: July 12, 2014

Published online: October 21, 2014

### ABSTRACT

To treat patients with an oro-pharyngeal swallowing dysfunction may be a challenge. All dysphagic patients must be individually evaluated. The dysfunction must be defined according to its etiology. Knowledge about the physiology and anatomy of the normal swallowing function is therefore essential. A team approach may be necessary for a good outcome. The actual pathophysiology should be documented on a clinical and/or instrumental examination. In a videofluoroscopic swallowing examination (VFSE) the entire swallowing sequence could be analysed, and how different therapeutic strategies as well as modified textures affect the physiology of swallowing. In this manuscript an overview of different therapeutic strategies most commonly used among speech and language pathologists (SLP) in the management of dysphagic patients are presented. In some of the techniques there is a lack of evidence, and more well designed clinical trials are necessary to be sure whether a specific technique is a good option for the patient or not. However, it must always be the pathophysiology that guides the choice of adequate swallowing technique.

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Key words: Behavioural swallowing therapy; Speech language pathologist; VFSE team work

Bülow M. Behavioural Intervention. *Journal of Gastroenterology and Hepatology Research* 2014; 3(10): 1301-1306 Available from: URL: <http://www.ghrnet.org/index.php/joghr/article/view/>

### INTRODUCTION

For every human being eating and drinking is essential. To swallow food and liquid is a complicated and also very rapid process. Several muscle groups have to be activated and coordinated in the very exact moment to avoid misdirected swallowing.

In the management of patients with impaired oro-pharyngeal swallowing it is necessary for the clinician to understand the dysfunction to be able to choose the most sufficient swallowing techniques<sup>[1,2]</sup>. To treat swallowing dysfunction requires therefore knowledge about the physiology and anatomy of the normal swallowing function<sup>[3-6]</sup>. In this manuscript an overview of different therapeutic strategies most commonly used among speech and language pathologists (SLP) in the management of dysphagic patients are presented. In some of the techniques there is a lack of evidence, and a lot of more research is needed to analyse whether a specific technique is a good option for the patient. However, from many years of clinical practise I have learned that sometimes many different strategies has to be used to help the patient to establish a safe and efficient swallow. In several cases a technique may work even if it isn't evidencebased. For example many patients benefit from thermal tactile stimulation, even if it not has not been proven that there is a good evidence for that specific technique. Our main purpose should always be to use evidencebased techniques in the treatment of our patients, and for that we still need more well designed research in the field.

A variety of different therapeutic strategies is available and could be implemented to establish a safe swallowing<sup>[1,7]</sup>. Such intervention program should be adjusted for the specific patient, and based on actual pathophysiology documented on a clinical and/or an instrumental evaluation<sup>[7,8]</sup>. Oro-pharyngeal impairment that may lead to swallowing dysfunction could be chewing problems, residue in the oral cavity a delay in the initiation of the pharyngeal swallow, misdirected swallowing (aspiration, penetration) and/or residue of bolus material<sup>[9]</sup>. The best treatment of such dysfunction may be different behavioural techniques such as head positioning, swallowing manoeuvres, sensory and motor techniques and/or diet modification<sup>[10-12]</sup>. However, due to a more global neurological disease that impairs cognitive capacity and speech, the patient with swallowing problems could have problems to communicate, and to

understand and follow instructions leading to difficulties to perform different swallowing techniques. Many patients are also too fatigued to participate in swallowing therapy. Diet modification is therefore essential for most dysphagic patients. In this article the most commonly used swallowing techniques are described according to their purpose. In some techniques also the instructions that should be given to the patient is presented. Most swallowing techniques requires a period of training to be used in a proper way, and some of the techniques should be performed in an intensive period of training, and other techniques used at every meal when swallowing food and liquid.

### TREATMENT TEAM

Even if a Speech Language Pathologist (SLP) may be “the spider in the net”, and responsible for implementation of a behavioural treatment program for oro-pharyngeal dysphagia, a team approach is in most cases necessary for a good outcome<sup>[1,13]</sup>. Professionals with specific competence have to collaborate, to establish a safe and efficient swallowing/nutrition based on the patient’s diagnose and prognosis. Nursing staff could play an important role both to help an inpatient performing the actual swallowing technique, and to give the patient the modified textures that has been recommended. When it comes to outpatients the patient and sometimes the relatives have to collaborate so the treatment recommendations are followed.

The team members involved may be different from one case to another, and also from one hospital to another. Below is listed example of professionals that may be involved in a treatment team, and their function.

Table 1 Example of professionals involved in a treatment team.	
SLP	Decisions regarding treatment programs
Dietician	Diet modification and how to prepare modified textures
Physician	Ethical discussions regarding treatment
Nurse	Helps the patient to perform different training programs
Physiotherapist	Helps the patient to find optimal postural positioning technique during meals
Occupational therapist	Find the best eating aid
Social worker	Ethical discussions regarding treatment, and psychological support
Dental hygienist Dentist	Dental status, chewing problems
Psychologist	Ethical discussions regarding treatment, and psychological support

### ETHICS

Swallowing problems could be a symptom in many different disease processes, and be associated with malnutrition, dehydration and death. Ethical discussions may be a necessary part of the treatment, even if the decisions, if so are possible, should belong to the patient and/or to the family<sup>[14-19]</sup>. There may be cases when the patient and/or family want to continue an oral intake even if the actual dysfunction is severe, and not permit a safe oral intake. Some patients refuse tube feeding or specific diet modification for example thickened liquids. In the treatment of dysphagic patients the patient’s satisfaction and improvement of the quality of life are essential<sup>[20]</sup>.

However, decisions regarding treatment have to be realistic in relation to the patient’s dysfunction and ability to participate (age, condition, cognition, communication). Risks of unsafe oral nutrition must be analyzed from different aspects. Another aspect to be considered is; “Does the patient benefit from therapy?” Some patients

will probably never come back to a normal swallowing, and some patients are out of help. Repeated information is necessary to be convinced that the patient and relatives have understood the actual dysfunction and how it will affect the swallowing ability. It has also to be known that there are several patients that never get the opportunity to get help, and be diagnosed. Thereby they have a decreased quality of life, and that could result in a restricted social life.

### SWALLOWING INTERVENTION

From a clinical or/and instrumental examination any actual oral and pharyngeal dysfunction could be documented. In severe cases a clinical examination is not enough and an instrumental examination for example a Videofluoroscopic Swallowing Examination (VFSE) has to be performed. A VFSE examination could give valuable information for the swallowing clinician in the decisions regarding to choose the best therapeutic strategy. In a VFSE, the only instrumental method where the entire swallowing sequence could be analysed, and therefore considered gold standard, any swallowing dysfunction could be analysed<sup>[21-30]</sup>. During the VFSE both different textures of food and liquid as well as different swallowing techniques could be tested. Also another instrumental method, a fiberendoscopic swallowing examination (FEES), may be valuable in the evaluation of a dysphagic patient even if the moment of swallowing not can be visualized in that method<sup>[31]</sup>.

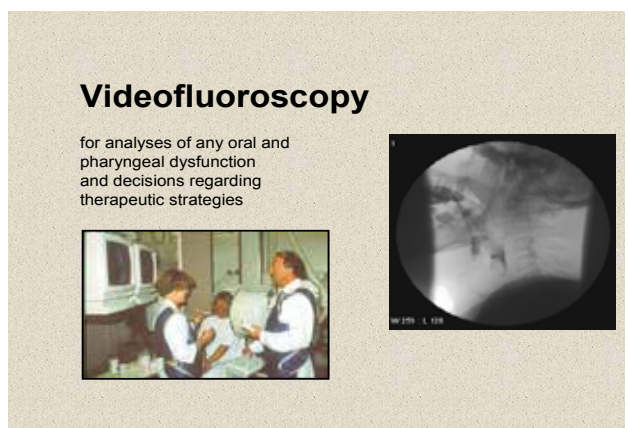


Figure 1 The videofluoroscopy suite with SLP, radiologist, and the patient, and a radiograph of the pharyngeal area in lateral projection.

Table 2 Oral dysfunction analysed on VFSE.

Leakage (anterior, posterior)
Oral residue
Inefficient tongue movements and mastication
Delayed bolus transport
Diffuse spreading of bolus in oral cavity
Lingual propulsion of food and liquid
Aspiration before pharyngeal swallow
Regurgitation into nasal cavity

Table 3 Pharyngeal swallow analysed on VFSE.

Laryngeal elevation
Hyoid bone movement
Epiglottic movement
Delayed initiation of pharyngeal swallow
Vestibulum laryngis closure: (1) penetration; (2) aspiration.
Constrictor muscle activity
Retention valleculae and/or pyriform sinuses
Absent pharyngeal swallow

**Treatment to be tested for oral dysfunction during VFSE**

**Bolus manipulation:** (1) optimise food/liquids texture; (2) sufficient volumes; (3) intraoral placement.

**Different head positioning techniques:** (1) tilt to unimpaired side; (2) chin tuck.

**Double swallow****Treatment to be tested for pharyngeal dysfunction during VFSE**

**Modified textures and controlled bolus volumes:** (1) Double swallow; (2) Controlled bolus volume; (3) Thickened liquids; (4) Purée, paté, timbale

**Sensory stimulation:** (1) Carbonated Liquids; (2) Sorbet (sour).

**Swallowing techniques****Head positioning****POSTURAL ADJUSTMENTS-HEAD POSITIONING TECHNIQUES**

Different position techniques may be of great value, are often used, and is for most dysphagic patients fairly easy to perform. Head positioning adjustment is a compensatory strategy that according to Logemann (1998) successfully could eliminate misdirected swallowing of liquids in 75-80% of the time<sup>[8]</sup>. Below the most commonly used head-positioning techniques are described, and also their purpose.

**Head down (chin tuck)**

Purpose; to be used when there is a reduction in posterior tongue base motion, unilateral laryngeal dysfunction, delayed initiation of pharyngeal swallow or reduced laryngeal closure.

**Head back**

Purpose; to be used when there is a disturbed oral transit.

**Head rotated to damaged side**

Purpose; to be used when a reduced laryngeal closure and unilateral pharyngeal paresis is documented.

**Head tilt to stronger side**

Purpose; to be used when there is a unilateral oral and pharyngeal weakness on the same side to direct given bolus down the stronger side.

**Lying down on one side**

Purpose; could be effective in reducing pharyngeal retention by taking advantage of gravity.

**SWALLOW MANOEUVRES**

The purpose of the different swallowing manoeuvres is to change selected aspects of the physiology of the pharyngeal swallowing<sup>[32]</sup>. However, even if it may be expected that such techniques could be effective, their complexity may preclude their applicability to patients suffering from communicative disorders, pulmonary disease, deconditioning, and fatigue. Swallowing manoeuvres should, in most cases, be used at every meal when swallowing food and liquid.

Many research projects have been performed to analyse the effectiveness of those techniques but still there is a need for well-designed randomized studies<sup>[33]</sup>.

**Supraglottic swallow**

Purpose: to protect airway before and during the swallow (glottal

closure); improves coordination of the swallow.

**Instruction to patient:** (1) inhale and hold breath; (2) swallow while holding breath; (3) cough and swallow again.

**Super supraglottic swallow**

Purpose: to help the arytenoids tilt forward, close the false vocal folds, and close the entrance to the airway.

**Instruction to patient:** (1) inhale; (2) hold breath and bear down hard; (3) swallow while holding breath hard; (4) cough and swallow again.

**Mendelsohn manoeuvre**

Purpose: Increases the duration and width of cricopharyngeal augmentation; reducing pyriform sinus stasis and eliminating aspiration; Improves coordination and timing of swallowing events; Strengthens and retrains the muscles of laryngeal elevation. Prolonged apnoeic phase of the swallow.

However, this technique could sometimes hard to teach; (Contraindication in patients suffering from respiratory disease or with severe incoordination between swallowing activity and respiration).

**Instructions to Patient:** (1) Swallow normally; (2) When you feel your voice box go up, grab it with your throat muscles and don't let it go down; (3) Hold it for 3 counts, then let it go; (4) Repeat 5 times, slowly.

**Alternative Instructions to Patient:** (1) Can you feel that when you swallow, there is a point where everything squeezes together? Next time you swallow, hold that squeeze; (2) (It is all right to use any kind of feedback that works—e.g. EMG, hand placement).

**Effortful swallow**

Purpose: The effort in this technique increases posterior tongue-base movement and thus improves clearance of bolus from valleculae.

However, Difficult to ascertain the amount of effort: maximal effort? Which (appropriate) muscle groups activated?

Options: Instrumental measurements & Clinical observation.

Instruction to patient: Swallow hard: swallow while pushing and squeezing all of the muscles (mouth and throat).

**Masako manoeuvre**

Anterior tongue-hold manoeuvre: Anterior tongue placed between the anterior teeth while swallowing.

Purpose: Increased anterior movement of posterior pharyngeal wall during swallowing

However: Could result in reduced duration of airway closure and increased post-swallow residue; Increased delay in the initiation of pharyngeal component of swallow. This manoeuvre should not be used with bolus!

**Shaker exercise**

Isotonic/Isometric exercise.

Purpose: improve opening of the PES that could result in reduced residue after swallow and less aspiration<sup>[34]</sup>.

Instruction to patient.

**Isotonic exercise**

Lie supine and raise the head (but not the shoulders) sufficiently to see the toes.

Hold your head up for 1 minute; you may not be able to hold your head up for the full minute at the beginning of your therapy program. Make sure to continue breathing during the exercise.

Lower your head to rest position for 1 minute; if you cannot hold your head up for the full minute make sure your rest period is for the same duration as the time you could hold your head up.

Repeat the last three steps 3 times.

#### Isometric exercise

(1) Lie on your back (no pillow); (2) Elevate your head until you can see your toes; do not lift your shoulders; do not hold the position; (3) Lower your head to rest position; (4) Immediately repeat up to 30 times, keeping the raising and lowering rhythm constant.

## SENSORY AND MOTOR BEHAVIOURAL TECHNIQUES

Different sensory and motor behavioural techniques could play an important role in the rehabilitation of impaired swallowing including both various swallowing techniques and modified textures depending on the actual pathophysiology. Example of such techniques are listed, and described below.

1. Modified solids and liquids, viscosity, taste, placement and amount;
2. "Suck-swallow";
3. Thermal Tactile Stimulation;
4. Sour and cold stimuli;
5. Carbonated liquids;
6. Oral motor exercises;
7. Breathing exercises;
8. Electrical stimulation: (a) Neuromuscular electrical stimulation; (b) Pharyngeal electrical stimulation.

#### 1 Modified textures

Solids and liquids have been documented on videofluoroscopic examinations to be effective as treatment methods. Also placement and amount may be of importance to establish a safe swallow

#### 2 Suck swallow

Instructions to Patient: (1) Close your mouth; (2) Suck inside your mouth while pumping your tongue up and down; (3) Make swishing sounds and pump your jaw as you suck, but keep your lips closed; (4) When you feel the need to swallow, go ahead and do it; (5) Repeat 5 times.

#### 3 Thermal Tactile Stimulation

Instructions to Patient: (1) Dip laryngeal mirror into a cup of ice for 10 seconds; (2) Lightly rub vertically up and down on the anterior faucial arch about 5 times on each side. (Make sure the metal side of the mirror is against the tissue); (3) Repeat on other side if anatomically intact; (4) Remove the mirror; (5) Pipette a few drops of water at the faucial arch; (6) Swallow.

Repeat the first three steps 10 times at least 4 times a day during 2-3 weeks. It is important that this technique is performed regularly otherwise no result could be expected.

#### 4, 5 Cold, sour stimuli, and Carbonated liquids

Such intervention may affect the biomechanics of the swallowing in an efficient way. So, cold and sour stimuli as well as carbonated liquids could be a good option for several dysphagic patients<sup>[35-37]</sup>. However it is important that such techniques are tested individually before recommendation. Carbonated liquids don't seem to work for patients with a progressive neurological disease.

#### 6 Oral motor exercises

Tongue Range of Motion Exercises.

Instructions to Patient:

Anterior: (1) Stick your tongue out as far as you can past your lips; (2) Hold it there for 2 counts. Relax. Repeat 5 times.

Posterior: (1) Pull your tongue straight back in your mouth as far as you can, as if you were gargling or yawning; (2) Hold it there 2 counts. Relax. Repeat 5 times.

Lateral: (1) Right: Move your tongue to the right side inside your mouth as far as you can. Hold it there 2 counts. Relax. Repeat 5 times; (2) Left: Move your tongue to the left side inside your mouth as far as you can. Hold it there 2 counts. Relax. Repeat 5 times.

Vertical: (1) Tongue Tip: (a) Open your mouth as far as you can and lift the tip of your tongue and place it behind your top teeth (or ridge where your teeth are); (b) Hold it there 2 counts. Relax. Repeat 5 times; (2) Back of tongue: (a) Open your mouth as far as you can and touch the back of your tongue to the roof of your mouth, as if you were going to say the "k" sound; (b) Hold it there 2 counts. Relax. Repeat 5 times.

#### 7 Breathing exercises

Dysphagia therapy may involve education regarding normal swallowing physiology. The coordination breathing – swallowing is necessary to be able to swallow in a safe way. In the moment of swallowing several swallowing muscles have to be coordinated, and a moment of apnoea occurs, and the entrance to the airways has to be closed. To educate the patient in breathing exercises may therefore be valuable.

#### 8 (a) Neuromuscular electrical stimulation (Vital Stim)

This is a technique that is said to restore the swallowing function. The technique strengthens the swallowing muscles, and improves the motor control of the swallow. However, it has also been found in research studies that the patients with the most severe dysphagia did not gain independence from their feeding tubes. Shaw *et al* concluded that VitalStim therapy clearly has a place in the management of dysphagia, but that the most severely afflicted are unlikely to gain dramatic improvement<sup>[38,39]</sup>.

#### 8 (b) Pharyngeal Electrical Stimulation

This technique seems to be a promising new treatment tested on stroke patients. This technique has in pilot studies shown to improve swallowing function 2 weeks after acute stroke by activating pharyngeal motor pathways. However, the long term effect is not known yet<sup>[40,41]</sup>.

## BOLUS MODIFICATION AND MANAGEMENT

Modified textures, and bolus manipulation is an important part in the treatment of oro-pharyngeal dysphagia, and is applied in most patients suffering from dysphagia To consider, and test sufficient bolus size, volume, viscosity, temperature and taste could be of great help to establish a safe and efficient swallow<sup>[42-44]</sup>.

When specific dysfunction is documented the following recommendations may be helpful for the patient.

**Delayed initiation of pharyngeal swallow:** (1) Start the meal with sour sorbet; (2) Thermal Tactile Stimulation before the meal; (3) Carbonated liquids.

**Weak pharyngeal muscles (retention):** (1) Purée or timbale, thickened sauce; (2) Carbonated liquids.

**Dry mouth:** (1) Start the meal with ½ teaspoon of oliveoil or any other tasty oil; (2) "Dip" solids into tasty oil.

Food and liquids should be easy and safe to swallow, healthy, tasty and appetizing. All textures should be tested before recommendations are given. A contact with a dietician is of great value when different nutrients have to be prescribed. To eat and drink could, if so is possible, be the very best swallowing training, and if the patient could eat and drink on her/his own.

## BIO FEEDBACK

An adjunctive biofeedback method could both for the patient and for the therapist be of value to objectively analyse whether the actual therapeutic strategy works in an effective way in the patient's actual dysfunction. Thereby the actual intervention method could be evaluated. As example of feed-back methods could be mentioned; (1) Videofluoroscopy (VFS – MBS); (2) Nasoendoscopy (FEES); (3) Cervical auscultation; (4) Surface electromyography (sEMG).

## CONCLUSION

To treat patients with an oro-pharyngeal dysphagia may be a challenge. All dysphagic patients must be individually evaluated. The dysfunction must be defined according to its etiology. However, it has to be the pathophysiology that guides the choice of adequate swallowing technique, and most ideally all treatment should be evidencebased.

The actual pathophysiology should most ideally be documented on a clinical and/or instrumental examination. A videofluoroscopic swallowing examination is a splendid method in analysing the entire swallowing sequence, and in the evaluation of how different therapeutic strategies, and different modified textures affect the physiology of swallowing. A team approach is in most cases also necessary for an effective outcome.

By applying sufficient therapeutic strategies a safe and efficient swallow could be established and thereby increase the quality of life, and give a good social life for dysphagic patients. To treat a dysphagic patient may also be cost effective and reduce the time of stay at hospital.

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**Peer reviewers:** Amy Mandaville, University Medical Center at Brackenridge, 601 E. 15th Street, Austin, TX, 78701, the Untied States; Masako Fujii-Kurachi, Department of Rehabilitation, Niigata University of Rehabilitation, 2-7-6 Kaminoyama, Niigata, Murakami, 958-0053, Japan; Takahiro Ono, Department of Prosthodontics, Gerodontology and Oral Rehabilitation, Osaka University Graduate School of Dentistry, 1-8 Yamada-oka, Suita, 565-0871, Japan.