

Dysphagia management in tracheostomy patients: introduction of a protocol

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Key-words. Tracheostomy tube; swallowing disorders; protocol; FEES; speech pathology

Abstract. *Dysphagia management in tracheostomy patients: introduction of a protocol.* Possible comorbidity and the risk of aspiration mean that swallowing rehabilitation in tracheostomy tube patients with dysphagia demands, by comparison with the approach to other patients with deglutition disorders, a well-considered therapy plan. However, the literature provides poor guidance for the role of the speech pathologist and otolaryngologist in the early start of oral feeding and decannulation timing. This paper presents our view of the decision-making procedure in this specific field. Early instrumental evaluation with FEES performed by the otolaryngologist and speech pathologist is a reliable and non-invasive tool that allows for the easy detection of swallowing problems and for the initiation of, and support for, swallowing rehabilitation. We hope to convince clinicians and therapists to consider FEES before starting oral feeding. This interdisciplinary approach may allow us to provide good-quality care and safe outcomes for these patients.

Introduction

Clinical indications for tracheostomy can be broken down into three groups: unstable or obstructive airway, prolonged mechanical ventilation, and tracheobronchial toilet or aspiration. Advances and improvements in the treatment of critical illness have resulted in more patients who require airway and ventilatory support. Intensive care unit (ICU) patients with a tracheostomy placed for an unstable or obstructive airway are more likely to undergo early successful decannulation than patients with a tracheostomy for other indications such as neurological deficits or pneumonia. In head and neck surgery, cannula placement may be required at the time of the operation when there is oedema, obstructions to the patient's breathing, or when airway protection is needed in the case of aspiration. Once the oedema subsides, this may imply rapid decannulation and the initiation of swal-

lowing therapy if needed. Depending on the indication, intervention by a speech pathologist (SLP) is not always necessary in tracheostomy patients.

Clinicians understand that tracheostomy decannulation is not without risk, but evidence-based tracheostomy guidelines are being developed to facilitate the safe and effective management of patients with tracheostomies.

A recent international, cross-sectional survey of physicians and respiratory therapists was designed to examine tracheostomy decannulation opinions around the world. Tracheostomy care varies significantly depending on the views of individual clinicians.¹

The literature mentions the evaluation of deglutition and swallowing rehabilitation but the role of the speech pathologist in the acute care setting for this population remains unclear. Frank *et al.*² consider interdisciplinary treatment (physician, nurse and speech pathologist) to be efficient in accordance with guidelines

and a decision chart for decannulation presented by the Basel REHAB.

Speech pathologists are often called in after dysphagia has been detected by the physicians. Oral feeding will already have been started by then in patients with a cuffed tracheostomy tube, without consideration of the possibility of micro-aspiration or aspiration/silent aspiration. We have noticed that, when SLPs are consulted by an ICU team, patients' swallowing problems will be more severe on that ward. Associated comorbidities in these medically fragile patients may delay the onset of safe oral feeding. We strongly believe that the SLP should be consulted before eating and drinking in any patient with a tracheostomy tube and a possible dysphagia indication. We are convinced that there is a role for the SLP in the early diagnosis and treatment of swallowing disorders. The SLP can organise swallowing rehabilitation on a possible long-term basis, with the highest

priority for the patient's pulmonary safety.

Years of clinical practice and good cooperation between the SLP and ENT (otolaryngologist) in our department have resulted in efficient practice for the treatment of swallowing disorders in tracheostomy tube patients. Timing plays a highly important role in the start of oral feeding and the decannulation procedure. We focus on the information from the assessment and objective information obtained by FEES throughout the rehabilitation program.

1. Effects of a tracheostomy tube on airway protection and swallowing

1.1. *Swallowing problems* may be caused by stroke, neurological disease, brain trauma or the presence of a local process such as a laryngeal tumour treated surgically or with radiotherapy, and they may therefore be in place prior to the placement of a tracheostomy cannula.

1.2. *The causal relationship between aspiration and the presence of a tracheostomy tube* has been discussed by different authors.³ Donzelli *et al.*⁴ do not support the clinical notion that patient swallowing function will improve once the tracheostomy tube has been removed. Others suggest a relationship between the presence of a cannula and an increased risk of aspiration. Several plausible explanations can be given, as described in Table 1.

Critical illness neuropathy in ICU patients causing muscle atrophy may involve the laryngeal muscles and therefore swallowing efficiency.

The underlying neurological or medical disease alone, or the

Table 1
Physiological and mechanical impact of a tracheostomy tube on swallowing

Decreased elevation and anterior rotation of the larynx due to anchoring of the trachea to the strap muscles and skin of the neck caused by the inflated tracheostomy tube cuff
Oesophageal compression caused by impingement of the tracheostomy cuff on the oesophageal wall
Significant attenuation of the adductor vocal fold reflex, resulting from a lack of air-flow through the upper airway
Gradual decrease in abductor vocal fold activity
Reduction in subglottal airway pressure with desensitisation of the larynx and hypopharynx
Reduced cough and swallowing

physiological factors associated with a tracheostomy tube, may also account for the dysphagia.

1.3. *Psychological factors*

The first report on tracheostomy covering quality of life in non-cancer patients and conducted with specific psychological questionnaires found significant reductions in life satisfaction, body-image perception and affected extroversion.⁵ Psychological support, particularly in patients with long-term tracheostomy, should be integrated in swallowing rehabilitation in order to keep the patients and their relatives motivated for treatment.

In this article, we would like to focus on the assessment and management of swallowing problems in tracheostomy patients, and on the timing of decannulation as used in our clinical practice. The form that management takes in our setting will be described step by step in the following protocol.

2. Protocol

Figure 1 illustrates the procedure for the evaluation and treatment of

dysphagia in tracheostomy tube patients, as performed at the ENT/SLP department of the AZ Sint-Jan AV, Bruges

2.1. *Assessment and treatment of swallowing disorders: medical and oropharyngeal conditions*

When a patient is referred to the ENT/SLP, a bedside assessment usually follows as soon as possible. We collect information about the **medical condition (STEP A)** of the patient, and additional data from the nursing staff and physiotherapist. Different factors may be taken into consideration: prior swallowing history, the presence of concomitant diseases, effect of medication, type, date and reason for the placement of the tracheostomy tube, respiratory and pulmonary status, type of ventilation, rate of suctioning, mode of nutrition and mental status of the patient. The level of alertness, attention, concentration, agitation and the presence of cognitive deficits or aphasia are of great importance during the first contact. The patient's mental and physical condition is the indicator for early therapy initiation since

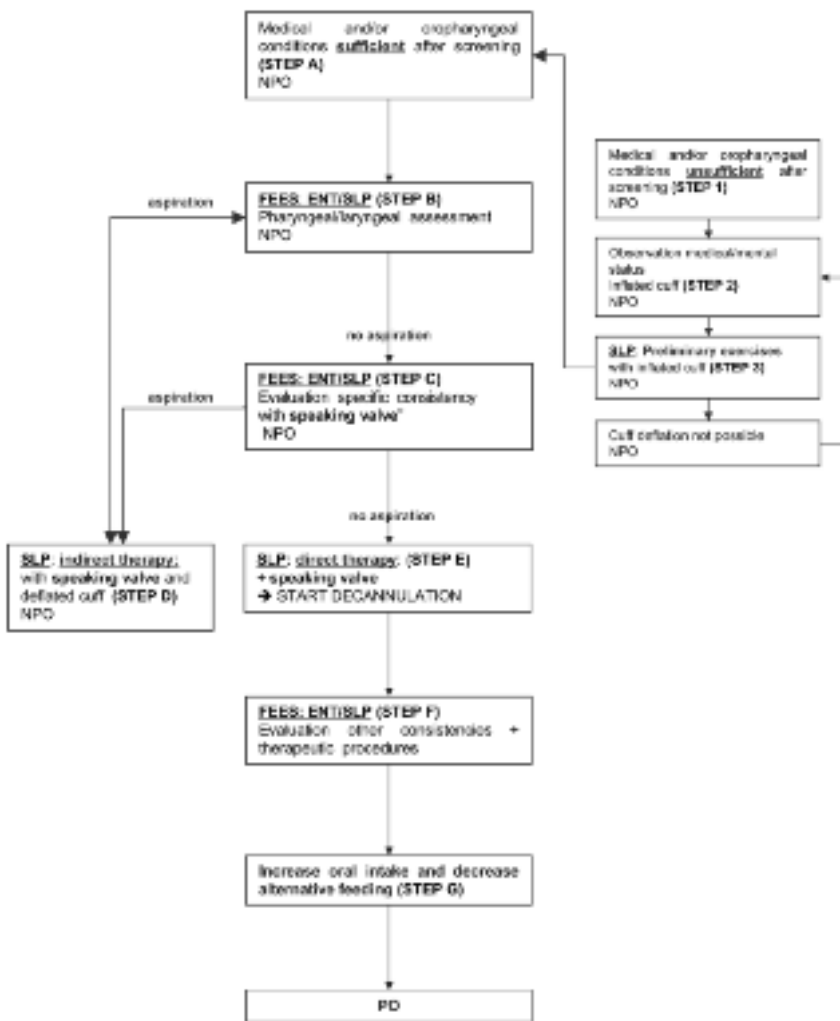


Figure 1

Procedure for the evaluation and treatment of dysphagia in tracheostomy tube patients, as performed at the ENT/SLP department of the AZ Sint-Jan AV, Bruges.

rehabilitation depends on comprehension and the cooperation and physical strength of a patient.

The following **oropharyngeal conditions (STEP A)** are crucial in determining whether clinical swallowing evaluation with foods and liquids can take place or not. Oropharyngeal motor and sensory function of the cranial nerves involved in swallowing (n. V, VII, IX, X and XII) are evaluated. The presence of cough reflexes and the possibility of a volitional cough to clear secretions should be assessed carefully. Vocal quality

can tell us more about vocal fold function (e.g. hoarseness and vocal fold paralysis), and wet phonation caused by saliva or secretions pooling in the larynx can be a sign of aspiration and reduced laryngeal sensation. Pronunciation and intelligibility of speech also tell us more about oral motor function. Respiratory rate and oxygenation are of great importance since coordination between breathing and swallowing is necessary for safe swallowing.^{6,7} The SLP has to check the management of saliva

and oral hygiene. Poor oral conditions may cause pathogenic bacterial colonisation and contribute to an increased risk of aspiration pneumonia in these fragile patients.⁸ The patient should be able to sit in an upright position with sufficient head control for safe swallowing.

Contra-indications for clinical instrumental evaluation (**STEP 1**) are: medically (pulmonary, cardiac) unstable or fragile patients, patients with severe cognitive impairment, patients who are agitated or anxious or patients who need frequently suctioning for purulent secretions. FEES will be described in the following section.

2.2. Instrumental assessment: FEES

FEES (Fiberoptic Endoscopic Evaluation of Swallowing, Langmore, 2001)⁹ is a powerful instrumental procedure that allows the ENT and SLP to visualise the soft palate, larynx and hypopharynx directly from above, before and after swallowing, detecting aspiration while the patient is given a variety of consistencies of food and liquids to swallow. The procedure can be performed at the bedside or in the clinician's office, depending on the patient's physical condition, and can be repeated as often as needed during the swallowing therapy. Rehabilitation may involve postural changes, compensatory strategies or swallowing manoeuvres. Important advantages of FEES are that there is no exposure to radiation and that the procedure can be conducted at the patient's bedside as often and as long as needed. FEES is therefore a better choice in early investigation in this medically compro-

mised or unstable population than the videofluoroscopy procedure. FEES examinations are performed in our department with an Olympus Visera OTV-S7 Digital Processor.

Depending on the conditions described under **STEP A, instrumental assessment** will take place to visualise pharyngeal and laryngeal anatomical structures and physiological movements in swallowing and phonation. In **STEP B, FEES** provides the ENT/SLP with the evidence needed for overt or silent aspiration, and gives a clear picture of the management of secretions. Cuff deflation – which is only performed after thorough suctioning – and digital occlusion of the tube normalises airflow through the glottis. So the ENT/ SLP can evaluate airway protection abilities, vocal quality and laryngeal elevation in conjunction with a high pitch tone, a volitional cough or dry swallow. The patient's ability to swallow or to expectorate saliva and secretions can be observed during endoscopy. These images can be digitally stored on the DicomIzer, a software program for digitising film, and used as biofeedback in therapy.

2.3. Indirect swallowing therapy

A. *Total cuff deflation* is the aim if oral feeding is to be considered. If there is pooling of saliva and secretions or massive aspiration when the cuff is deflated, we will not move on to food or liquids. Flexible endoscopy also makes it possible to detect aspiration beneath the deflated cuff. If there is aspiration, this will bring us to **STEP D** in the diagram and **indirect swallowing therapy** will be started.

At this point the patient still is **NPO** (=nothing by mouth). This recommendation is correct in terms of airway protection, but sometimes difficult to explain to the patient and his relatives. A dry mouth is a frequent complaint in these patients, even when the nursing staff provides good oral hygiene. Unfortunately, many patients have to practice for some days or weeks with the speech pathologist to restore impaired swallowing physiology in indirect swallowing therapy. This phase of the treatment is often dispiriting, and the SLP has to provide continuous support for the patient, his family and the team, something which requires more skills than just purely theoretical knowledge.

B. *The use and effect of the placement of a one-way valve or speaking valve on the tracheostomy tube during indirect swallowing therapy*

Good suctioning and cuff deflation are necessary prior to valve placement. During inspiration, the valve opens, allowing airflow into the upper airway. Upon expiration, the valve closes, directing the air through the larynx/pharynx/oral cavity. This unidirectional airflow not only restores normal respiratory function but also enables phonation. This is often an emotional event for patients and their relatives, since the patients can be heard again after what has sometimes been a silence of several weeks. Cuff deflation in combination with a speaking valve improves oral communication and may help to restore some biomechanical features of swallowing and the clearance of secretions. Some authors contest the physiological effect of tracheostomy tube occlusion on aspiration.^{10,11}

We have learnt in daily practice that restoring verbal communication enhances indirect therapy, followed by effective airway protection in the case of aspiration and therefore a quicker and safer start of oral feeding.^{7,12}

C. Procedures

Indirect swallowing therapy includes techniques for swallowing rehabilitation, without the use of food and liquids (Table 2).

In the beginning, these exercises are performed daily after the proper suctioning of secretions in the oral cavity, the oropharynx, the cannula and beneath the cuff after deflation, always in combination with the one-way-speaking valve. Depending on the patient's tolerance of the valve and ability to maintain adequate ventilation, we gradually increase the duration of the therapy sessions. Starting with a few minutes of cuff deflation and valve placement, we also encourage the patient and the nursing staff to use the valve as much as possible with family and visitors to restore phonation, speech and consequently the patient's swallowing ability.

When improvement is noticed in the management of saliva and secretions or the quality of speech, we repeat **STEP C** by performing another FEES that may show changes in laryngeal physiology, leading us to an evaluation with liquids or food.

If no aspiration is noticed, these observations will take the patient to **STEP E**, where **direct therapy** starts. If the ENT/SLP decides to postpone oral intake due to unsafe or ineffective swallowing, indirect therapy has to be continued until another FEES shows improvement (**STEP B**).

Table 2
Indirect treatment procedures

Oral motor tasks: specific articulatory exercises and a range of motion exercises to increase the strength of movement of the lips, jaw, oral tongue and the base of the tongue and to facilitate bolus control and mastication

Laryngeal excursion exercises such as pitch variation and sliding into falsetto for laryngeal elevation; manoeuvres for voluntary control of pharyngeal swallow physiology using techniques such as effortful swallow, supraglottic swallow, super-supraglottic swallow and the Mendelsohn manoeuvre for laryngeal elevation and optimal airway closure during swallowing

Vocal fold adduction exercises to restore complete glottic closure and airway protection such as coughing and throat clearing, respiratory support for phonation, forceful phonation, pushing exercises, laryngeal valving, valsalva manoeuvre, exercises for pitch and loudness.

In a minority of patients, medical and oropharyngeal status do not change over time (**STEP 2**). These patients may not move to **STEP A** and they keep their tracheostomy cannula cuffed for an unlimited duration. In patients with severe cognitive deficits caused by brain damage and in patients with poor awareness and cooperation, we try to alert and stimulate them for swallowing and communication (**preliminary exercises**) (**STEP 3**). Positioning of the patient, cleaning of the oral tract and teeth, gustatory and olfactory stimulation, and support for verbal and written communication can be useful in raising patient vigilance and cooperation with swallowing treatment.

2.4. Direct swallowing therapy

During FEES, the patient is presented with different food consistencies (ice chips, milk, yoghurt) to determine whether aspiration occurs (**STEP C**). The Evan's blue dye test can also be performed to detect aspiration.^{7,13,14} Although its diagnostic accuracy may be questioned by some authors,¹⁵ we sometimes use it, since it is relatively inexpensive and simple to perform.

Some dysphagic patients may move on to direct therapy during their first endoscopic evaluation. This is **STEP E**, in which safe and efficient swallowing can be observed with saliva or one or more consistencies, with the speaking valve on, for unidirectional airflow and pressure.

Reassessment with FEES will take place in **STEP F**. Previously learned postural changes, compensatory strategies and manoeuvres will now be used with other food and liquids to increase oral nutrition.

We will seek to introduce a gradual change to the amount and variety of oral intake, and cut back on alternative feeding (with a nasogastric or percutaneous gastrostomy tube) (**STEP G**). At that point, the patient and the nursing team can be instructed for carry-over.

Ultimately, our common goal is safe, efficient, independent and nutritionally complete feeding by mouth (PO).

FEES remains the best tool for the rapid evaluation of deglutition and immediate rehabilitation and early feeding,¹⁶ for monitoring progress during swallowing therapy and for determining **the timing of tracheostomy decannulation**.

3. Decannulation timing

When the patient reaches **STEP E** of our diagram, in which the absence of aspiration is observed by FEES for a specific consistency, secretions are under control and the patient produces a good cough, the ENT starts the decannulation process. Other important criteria are that mechanical ventilation is no longer needed, and that cuff deflation and a speaking valve are well tolerated.¹⁷ Since there is no consensus in the literature about the timing and method of decannulation, we usually start downsizing the cannula after 24 hours of successful cuff deflation and good tolerance of the one-way-valve, prior to definitive decannulation. Even at that point, replacement of the cannula can be necessary if there is stridor due to granulation tissue or trachea-stenosis. Medical intervention is then needed to solve the problem before another decannulation attempt can be made.

Once the critical moment of decannulation has passed, the frequency, consistency and amount of oral intake will be gradually increased and alternative feeding will be decreased subject to agreement between the physician, ENT, SLP and dietician (**STEP G**). The SLP continues to assist the dysphagic patient until eating and drinking is safe. The nurse or occupational therapist may take over until adequate feeding is achieved.

Conclusion

The management of dysphagic tracheostomy tube patients is often a long procedure requiring the involvement of different disciplines to ensure safe, effective and

adequate nutrition and hydration. Early instrumental evaluation by FEES is a reliable and non-invasive tool that allows us to detect swallowing problems easily. It is performed by the ENT/SLP at several stages in swallowing therapy, preventing life-threatening aspiration pneumonia. We hope this diagram may help clinicians and therapists to provide good-quality care and achieve safe outcomes for these patients. We believe that continuous efforts should be made to develop evidence-based tracheostomy guidelines to facilitate safe and effective management in these patients.

References

1. Stelfox HT, Crimi C, Berra L, et al. Determinants of tracheostomy decannulation: an international survey. *Crit Care*. 2008;12:R26.
2. Frank U, Mäder M, Sticher H. Dysphagic patients with tracheotomies: a multidisciplinary approach to treatment and decannulation management. *Dysphagia*. 2007;22:20-29.
3. Leder SB, Ross DA. Investigation of the causal relationship between tracheotomy and aspiration in the acute care setting. *Laryngoscope*. 2000;110:641-644.
4. Donzelli J, Brady S, Wesling M, Theisen M. Effects of the removal of the tracheotomy tube on swallowing during the fiberoptic endoscopic exam of the swallow (FEES). *Dysphagia*. 2005; 20:283-289.
5. Gilony D, Gilboa D, Blumstein T, et al. Effects of tracheostomy on well-being and body-image perceptions. *Otolaryngol Head Neck Sur*. 2005; 133:366-371.
6. Goldsmith T. Evaluation and treatment of swallowing disorders following endotracheal intubation and tracheostomy. *Int Anesthesiol Clin*. 2000;38:219-242.
7. Dikeman KJ, Kazandjian MS. Assessment and management of dysphagia. In: Dikeman KJ, Kazandjian MS, Eds. *Communication and swallowing management of tracheostomized and ventilator-dependent adults*. Singular Publishing Group, San Diego; 1995:251-283.
8. Langmore SE, Terpenning MS, Schork A, et al. Predictors of aspiration pneumonia: how important is dysphagia? *Dysphagia*. 1998;13:69-81.
9. Langmore SE. *Endoscopic evaluation and treatment of swallowing disorders*. Thieme, New York; 2001.
10. Leder SB. Effect of a one-way tracheotomy speaking valve on the incidence of aspiration in previously aspirating patients with tracheotomy. *Dysphagia*. 1999;14:73-77.
11. Suiter DM, McCullough GH, Powell PW. Effects of cuff deflation and one-way tracheostomy speaking valve placement on swallow physiology. *Dysphagia*. 2003;18:284-292.
12. Britton D, Jones-Redmond J, Kasper C. The use of speaking valves with ventilator-dependent and tracheostomy patients. *Curr Opin Otolaryngol Head Neck Surg*. 2001;9:147-152.
13. Donzelli J, Brady S, Wesling M, Craney M. Simultaneous modified Evan's blue dye procedure and video nasal endoscopic evaluation of the swallow. *Laryngoscope*. 2001;111:1746-1750.
14. Belafsky PC, Blumenfeld L, LePage A, Nahrstedt K. The accuracy of the modified Evan's blue dye test in predicting aspiration. *Laryngoscope*. 2003;113:1969-1972.
15. Leder SB, Acton LM, Lisitano HL, Murray JT. Fiberoptic endoscopic evaluation of swallowing (FEES) with and without blue-dyed food. *Dysphagia*. 2005;20:157-162.
16. Hafner G, Neuhuber A, Hirtenfelder S, Schmedler B, Eckel HE. Fiberoptic endoscopic evaluation of swallowing in intensive care unit patients. *Eur Arch Otolaryngol*. 2008;265:441-446.
17. Kent LC. Tracheostomy decannulation. *Respir Care*. 2005;50:538-541.

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