

Functional evaluation protocol

Protocollo di valutazione funzionale

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Correct deglutition is the result of a precise coordination of the many structures present in the head and neck, indeed, although the deglutition sequence can be influenced and controlled by inputs from the cortical centres, it is, first and foremost, a semiautomatic mechanism¹.

These mechanisms need correct sensory information from the muscles and mucosae of the areas involved, to generate a coordinated sequence of muscle contractions that generate the act of deglutition.

Consequently, any involvement of the sensory or motor integrity of the oral cavity, pharynx or larynx can cause dysphagia.

Therefore, surgery on the above areas can potentially cause dysphagia of varying severity.

This calls for the need to evaluate the impact that surgery can have in terms of dysphagia and, when possible, the need to quantify it, in relation also to the patient's quality of life. Despite the increasing application of the "organ saving" concept, surgical treatment, often followed by radiotherapy, remains the treatment of choice for most cancer sites in the head and neck.

Radiotherapy too can cause worsening, with the appearance or exacerbation of dysphagia secondary to xerostomy or radio-treated soft tissue fibrosis.

Given the current increasingly careful attention of surgeons to functional aspects, surgery must always take into account the need for surgical radicality, the strategy for optimally preserving swallowing, speech and respiratory function, to optimise the patient's quality of life.

Since all patients having pharyngeal-laryngeal cancer surgery are at risk of dysphagia, it is fundamental to perform an evaluation before restoring oral feeding, also considering that according to recent studies, patients with dysphagia always tend to underestimate their condition.

For this reason, the patient should undergo an initial "bed-side" assessment, followed by a more detailed and thorough study able to identify any episodes of silent aspiration.

This evaluation must be scheduled according to the type of procedure, local oedema, the presence of postoperative complications (such as pharyngocutaneous fistula) and the patient's psychological conditions.

The functional protocol can be broken down into the analysis of the fundamental functions of the pharyngolaryngeal organ, i.e., an evaluation of swallowing, speech and

respiratory functions, which together contribute to influencing the patient's quality of life.

Assessment of swallowing

FEES (Flexible endoscopic evaluation of swallowing) was described for the first time by Langmore, Schatz and Olsen, in 1988^{2,3}, and allows evaluation using a flexible rhinofibrolaryngoscope via the transnasal route (optionally combined with a stroboscopic light source and, by digital video camera, to a video recorder) and, therefore, can only be conducted by a team of phoniatrists-speech therapists working in a fully-equipped clinic.

The tip of the fibroscope is introduced as far as the oropharynx, from which point the attitude of the structures that control swallowing are studied. Coloured jelled water can also be used.

The potential interference of local anaesthetic on this functional evaluation is controversial.

This technique allows a careful evaluation of:

- the anatomical integrity of the nasopharyngo-laryngo-hypopharyngeal area;
- the sensitive integrity of the pharyngolaryngeal structures;
- the patient's ability to protect his/her respiratory tract;
- the symmetry of pharyngeal constrictive ability and the simultaneous contribution of the lingual phase;
- programming of an injective functional therapy;
- the possibility to evaluate food residues in the pharynx, aspiration and incorrect ingestion.

In the evaluation of deglutition, in addition to FEES, *videofluoroscopy*^{4,5} is a fundamental method as the analysis of the deglutition dynamic makes it possible to identify organic and functional abnormalities, thus allowing important therapeutic reflexes and giving the therapist suggestions concerning the compensation mechanisms that facilitate the act of deglutition, in an attempt to improve patients' quality of life.

Various types of contrast agent (small boli of fluid barium, small boli of high density barium, barium paste, solid meal) can be used for videofluoroscopy, thus allowing a detailed study of the various phases of deglutition (oral, pharyngeal, laryngeal and hypopharyngo-oesophageal). This allows us to identify various types of aspiration:

- predeglutition (before deglutition);

- intradeglutition (during deglutition);
- postdeglutition (after deglutition).

This technique also makes it possible to assess the morphology of the spine (marked kyphosis or DISH syndrome, for example, can favour episodes of aspiration) and obtain important information (in terms of bolus volume and viscosity, head position alterations) for rehabilitation strategy purposes.

Compared to videofluoroscopy, FEES has the following: *Advantages:*

- It is a safer method when there is a high risk of inhalation;
- It guarantees visual feedback for the patient;
- It can be performed on an outpatient basis even in subjects who cannot be transferred to a radiology centre;
- Absence of repeated exposure to radiations.

Disadvantages:

- It is difficult to evaluate bolus management in the oral cavity;
- Visualisation is difficult during the act of deglutition, close to the base of the tongue and on the rear wall of the pharynx;
- It is more difficult to evaluate microaspiration or bolus penetration very close to the act of deglutition.

The patients we analysed underwent self-assessment of their dysphagia, in particular using the “MDADI”.

M.D. Anderson Dysphagia Inventory (MDADI) ⁶

This test investigates the patient’s deglutition abilities, for which he/she is asked to choose the score that best describes their situation (from 1 to 5: strongly agree, agree, no opinion, disagree, strongly disagree).

- (1) My swallowing ability limits my day-to-day activities.
- (2) I am embarrassed by my eating habits.
- (3) People have difficulty cooking for me.
- (4) Swallowing is more difficult at the end of the day.
- (5) I do not feel self-conscious when I eat.
- (6) I am upset by my swallowing problem.
- (7) Swallowing takes great effort.
- (8) I do not go out because of my swallowing problem.
- (9) My swallowing difficulty has caused me to lose income.
- (10) It takes me longer to eat because of my swallowing problem.
- (11) People ask me, “Why can’t you eat that?”
- (12) Other people are irritated by my swallowing problem.
- (13) I cough when I try to drink liquids.
- (14) My swallowing problems limit my social and personal life.
- (15) I feel free to go out to eat with my friends, neighbours and relatives.
- (16) I limit my food intake because of my swallowing difficulty.

(17) I cannot maintain my weight because of my swallowing problem.

(18) I have low self-esteem because of my swallowing problem.

(19) I feel that I am swallowing a huge amount of food.

(20) I feel excluded because of my eating habits.

Assessment of respiration

This allows us to assess the influence of the various types of partial resection of the laryngeal structures and identifies any influence of concomitant chronic bronchitis on the alteration of the flow-volume curve following partial laryngectomy surgery.

It is fundamentally based on *conventional spirometry* with the flow-volume curve represented according to the classification proposed by Miller and Hyatt (1973) ⁷ and Miller (1985) ⁸.

It would thus be useful to standardise periodic spirometric evaluation in protocols that assess the various units after the stabilisation of the post-surgical functional situation.

Assessment of speech

Perceptive assessment of dysphonia is performed using the *G.I.R.B.A.S. scale* ^{9 10}.

Grade: 1 mild, 2 moderate, 3 severe.

Instability: 1 mild, 2 moderate, 3 severe.

Roughness: 1 mild, 2 moderate, 3 severe (with diplophonia: d).

Breathiness: 1 mild, 2 moderate, 3 severe.

Astenicity: 1 mild, 2 moderate, 3 severe.

Strain: 1 mild, 2 moderate, 3 severe (with tremor: t).

We perform the spectroacoustic voice examination using the “*SIFEL protocol*” ¹¹:

- Registration of a standard message containing: name and surname; the numbers 1 to 10; the five vowels /i/, /e/, /a/, /o/, /u/ held for 4 seconds; a short line from a song (“Frère Jacques”);
- Multiparametric analysis of the vowel /a/ using MDVP;
- Spectrogram of the same vowel /a/ analysed with MDVP, assessing the H/N Ratio, the noise components according to the spectrographic classification of dysphonia (modified Yanagihara’s classification), checking for the presence of diplophonia and/or tremors;
- Spectrogram of the word /aiuole/, evaluating the mean Fo and noise components according to the spectrographic evaluation of dysphonia;
- Automatic phonetogram with glissandos of the vowel /a/;
- Maximum phonatory time (normal value > 10 sec.).

All patients are then asked to do self-assessment tests for their dysphonia, in particular we use:

Voice Handicap Index (VHI-10)¹²

Instructions: indicate the answer you believe to be most truthful in your experience

0 = never; 1 = almost never; 2 = sometimes; 3 = almost always; 4 = always

F 1. My voice makes it difficult for people to hear me.

0 1 2 3 4

P 2. I run out of air when I talk.

0 1 2 3 4

F 3. People have difficulty understanding me in a noisy room.

0 1 2 3 4

P 4. The sound of my voice varies throughout the day.

0 1 2 3 4

F 5. My family has difficulty hearing me when I call them throughout the house.

0 1 2 3 4

F 6. I use the phone less often than I would like to.

0 1 2 3 4

E 7. I'm tense when talking to others because of my voice.

0 1 2 3 4

F 8. I tend to avoid groups of people because of my voice.

0 1 2 3 4

E 9. People seem irritated with my voice.

0 1 2 3 4

P 10. People ask: "What's wrong with your voice?"

0 1 2 3 4

	0	1 Slight	2 Moderate	3 Severe
VHI-10 =	—	Normal	alteration:	alteration:
	0	1-13	14-27	28-40

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