International consensus (ICON) on assessment of oropharyngeal dysphagia

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\section*{A R T I C L E   I N F O}

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Oropharyngeal dysphagia
Endoscopic evaluation of swallowing
Swallowing score
Deglutition self-evaluation questionnaire
Videofluoroscopic swallowing study

\section*{A B S T R A C T}

Objective: To present international recommendations regarding the proper evaluation of oropharyngeal dysphagia (OD), both objectively and subjectively (self-evaluation).

Methods: Following a thorough review of the literature, 5 experts in the field from 4 different continents answered separately a questionnaire regarding the work-up of OD. Individual answers were presented and discussed during the world ENT conference that was held in Paris in June 2017. This article will present the recommendations issued from that meeting.

Results: For the initial objective assessment of OD, it is recommended to perform either a functional endoscopic evaluation of swallowing (FEES) or a videofluoroscopic swallowing study (VFSS). FEES is the more popular investigation given its increased ease of use and accessibility. When evaluating for the presence of aspiration during the objective evaluation of OD, it is recommended to perform either a FEES or a VFSS. In this case, FEES is the favored investigation given its likely increased sensitivity. In order to highlight the presence of oropharyngeal food residue following the deglutition process, it is recommended to perform either a FEES or a VFSS; FEES likely being the more sensitive investigation while VFSS allows a better quantification of the amount of pharyngeal residue. It is also recommended to objectify the quality of the deglutition process by means of a score during the objective evaluation of OD. Finally, it is recommended to utilize a self-evaluation questionnaire during research studies exploring the deglutition process.

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\section*{1. Introduction}

Oropharyngeal dysphagia (OD) is defined as a disturbance in the passage of the food bolus from the mouth to the esophagus [1]. OD puts the patient at risk for aspiration pneumonia, malnutrition and dehydration, all of which increase morbidity [2]. Furthermore, understandably, OD has a significant impact on patient quality of life [3]. OD has various possible etiologies. Tumors of the aero-digestive tract and their respective treatments can lead to dysphagia. It is estimated that 14 to 18\% of these patients suffer from OD prior to any treatment [4,5]. Excisional surgery is linked to deglutition problems by directly injuring the organs involved. Radiotherapy gives rise to dysphagia early on secondary to oral mucositis, but also as a late complication secondary to muscular fibrosis [6]. When radiotherapy is combined with chemotherapy, the acute oral mucositis is more severe, increasing the likelihood of requiring enteral feeding [7]. Following the treatment of cancers of the aero-digestive tract, the ensuing dysphagia remains stable in 48\% of cases, diminishes over time in 32\% of cases and worsens in 20\% of cases [8]. Furthermore, neck and thoracic surgical
interventions, even those not performed for malignant tumors of the aero-digestive tract, can cause OD by injuring the nerves involved in deglutition, mainly the vagus nerve and its branches [9]. OD can also be observed in the context of neurodegenerative or diffuse neuromuscular disorders [10]. Neurovascular pathologies, which may also lead to OD, were voluntarily excluded from this guideline given the significantly varying context and nature of the work-up process.

Amongst the various assessment tools for OD, objective investigations as well as questionnaires evaluating patient quality of life may be offered to the patient. Objective investigations include the functional endoscopic evaluation of swallowing (FEES) and the videofluoroscopic swallowing study (VFSS). Various scores evaluating the quality of deglutition allow for the quantification of the patient’s symptomatology. The patient’s perspective is another means of assessment, relying on self-evaluation questionnaires regarding swallowing quality of life.

Currently, no consensus exists regarding the proper evaluation of OD. Differing assessment strategies are utilized depending on the center, the country and the practice habits. The objective of this recommendation is to highlight the main points of consensus regarding the evaluation of OD across the globe.

2. Methods

Given the lack of evidence-based proof by means of randomized controlled trials on the proper evaluation of OD by objective investigations or self-evaluation questionnaires, the opinion of 5 experts from 4 different continents (Europe, Asia, America, Africa) was sought out by means of a questionnaire based on a thorough review of the literature. A counsel of 2 medical experts was appointed in order to perform a systematic review of the literature on the subject. Keywords entered in the MEDLINE database included “oropharyngeal dysphagia assessment, aspiration, penetration, swallowing impairment, head and neck cancer, neurodegenerative pathology, cervical surgery, thoracic surgery, quality of life, scores, self-assessment” between 1995 and 2017. The 2 counsel experts then created a questionnaire consisting of fourteen questions, grouped under 5 headlines:

- objective investigations;
- food textures utilized;
- underlying complications (aspiration/residue);
- severity scale;
- self-evaluation scales.

The role of objective investigations as well as self-evaluation questionnaires in the work-up of patients presenting with a complaint of OD was successively broached, excluding neurovascular causes of dysphagia (Table 1).

The answers provided by the experts were collected, compared to the data available in the literature, and presented during the world ENT conference that was held in Paris on the 28th of June 2017. Recommendations were then formulated based on these results. The proposed recommendations were classified as grade A, B or C or professional consensus, in decreasing order based on the level of scientific evidence, in accordance with the guidelines for literature analysis and grading recommendations published by the Anaes (January 2000; Table 2).

3. Recommendations

A multidimensional evaluation of swallowing utilizing various tools is recommended in order to provide complimentary information regarding swallowing physiopathology, but also to aid in therapeutic decision-making. However, investigation methods vary depending on the country, the center and the individuals, mainly influenced by socioeconomic factors [11]. Clinical evaluation of dysphagia is performed first, before instrumental evaluation. Upon questioning, concepts reflecting the quality of swallowing are put to the patient, such as the texture of food ingested, the presence of cough during or after feeding. The duration of the meal is also raised. The severity of swallowing disorders is sought by measuring their impact on nutrition (looking for weight loss), as well as possible pulmonary complications (search for pulmonary infection or pulmonary fibrosis).

In terms of objective investigations for OD, there are 5 main exams cited in the literature (FEES, VFSS, esophageal manometry, pharyngeal pH monitoring, esophageal impedance pH monitoring). FEES and VFSS are considered the 2 most informative exams, allowing the identification of patients at risk for aspiration pneumonia [12]. FEES is more practical to perform in the clinical setting given that the only material requirement is a fiberoptic laryngoscope. In contrast, VFSS necessitates a dedicated radiology room and the use of contrast products. Furthermore, VFSS subjects the patient to radiation, while FEES does not. All of the above stated reasons render FEES the largely preferred initial diagnostic investigation. However, according to some of the experts, VFSS is the preferred initial exam when investigating for certain specific pathologies (Table 1).

The majority of the experts utilize various different textures when testing deglutition during a FEES study (liquid, thick liquid, cream, biscuit). The order of introduction of the textures may vary depending on the patient’s pathology. However, in the vast majority of cases, all textures are tested.

Recommendation 1: for the objective investigation of OD, it is recommended to systematically perform either a FEES or VFSS, FEES being the preferred initial investigation given its increased ease of use (professional agreement).

The medical literature has already broached the topic of comparing these 2 diagnostic exams in terms of detecting aspiration and pharyngeal residue. Giraldo-Cadavid et al. [13] listed 6 articles when constructing their meta-analysis. FEES seems to be the most sensitive investigation to detect the presence of penetration (laryngeal aspiration), aspiration (true tracheal aspiration) and pharyngeal residue. There is no significant difference in the sensitivity of FEES or VFSS to detect posterior oral incompetence. The specificity of both exams is comparable.

Three studies have compared FEES and VFSS by simultaneously performing both of these exams on a given patient. In other words, during a VFSS assessment, a fiberoptic laryngoscope is introduced and a FEES is performed in the same setting [14–16]. These studies also revealed that FEES is more sensitive in detecting laryngeal and tracheal aspiration, as well as pharyngeal residue. However, a limitation of FEES is the overestimation of the amount of pharyngeal residue. VFSS seems to better quantify the amount of residue. A recent study by Adachi et al. has questioned these findings by proposing that the intrusive insertion of a fiberoptic laryngoscope during a FEES exam can negatively affect the quality of the deglutition process [17]. This study performed VFSS exams with and without the simultaneous introduction of a laryngoscope. They showed that the rate of aspiration and pharyngeal residue was increased with the insertion of a laryngoscope. The question then becomes whether FEES is truly the more sensitive exam or whether the insertion of the fiberoptic laryngoscope alters the deglutition process and therefore artificially increases the exam’s sensitivity. Importantly, when the FEES exam was normal, so was the VFSS. The authors therefore concluded that if a FEES exam is normal, the
Table 1
Questionnaire and answers from 5 experts from 4 continents.

1. What instrumental assessment tools do you use in oropharyngeal dysphagia (OD)?
   a. Fiberptic endoscopic evaluation of swallowing (FEES)  GD: a, b, c
   b. Videofluoroscopy Swallowing Study (VFSS)  SB: a, b
   c. Esophagel manometry  NN: a, b, c
   d. Pharyngeal plaemetry  JA: a
   e. pH-impedance measurement  GP: a, b, c

2. In case you use FEES and VFSS, what is the time interval between each evaluation?
   a. You practice the 2 exams independently  GD: b
   b. You start with FEES and possibly followed by VFSS  SB: b, d
   c. You start with FEES and systematically followed by VFSS  JA: a
   d. You start with VFSS and eventually followed by FEES  GP: a
   e. You start with VFSS and systematically followed by FEES  GP: b

3. Does the pathology determine your choice of instrumental assessment between FEES and VFSS?
   a. No  SB: b
   b. Yes  NN: b

4. If yes, please confirm regarding the pathology:
   a. Post-radiotherapy of the head and neck: FEES (1)/VFSS (2)  SB: a, b, c, d (1)
   b. Post-oropharyngeal and laryngeal surgery for benign or malignant tumors: FEES (1)/VFSS (2)
   c. Post-neck surgery: FEES (1)/VFSS (2)  GD: a
   d. Dysphagia as first symptom of a neurodegenerative pathology: FEES (1)/VFSS (2)

5. When performing FEES, do you try food with different texture?
   a. still water  SB: a, b, d, e
   b. sparkling water  NN: a, c, d, e
   c. thick liquids (nectar)  JA: a, c, d, e
   d. yogurt/composte  GP: a, c, d, e
   e. biscuit  GD: a

6. Does the pathology determine your choice of food texture?
   a. No  SB: b
   b. Yes  NN: b

7. If yes, please confirm regarding the pathology:
   a. post-radiotherapy of the head and neck: liquid (1)/solid (2)  SB: a, b, c, d (1)
   b. post-oropharyngeal and laryngeal surgery for benign or malignant tumors: liquid (1)/solid (2)
   c. post-neck surgery: liquid (1)/solid (2)  GD: a
   d. dysphagia as first symptom of a neurodegenerative pathology: liquid (1)/solid (2)

8. In your experience, which exam is most sensitive for tracking aspiration?
   a. FEES  SB: a
   b. VFSS  NN: b
   c. Water swallowing  JA: a, b
   d. Self-questionnaires  GP: a

9. In your experience, which exam is most sensitive for tracking post-swallow residue?
   a. FEES  SB: a
   b. VFSS  NN: b
   c. Water swallowing  JA: a, b
   d. Self-questionnaires  GP: a

10. Do you use scores when analyzing swallowing?
   a. Never  SB: d
   b. Rarely  NN: c
   c. Sometimes  JA: a
   d. Often  GP: d

11. If yes, which one(s)?
   a. Penetration aspiration scale (PAS)  GD: a
   b. Pauloski’s Scoring test  SB: d
   c. Dysphagia outcome and severity scale (DOSS)  NN: a
   d. Fiberoptic endoscopic dysphagia severity scale (FEDSS)  GP: a
   e. Other (please clarify)  GD: a

12. Do you use swallowing self-assessment tests to assess oropharyngeal dysphagia?
   a. Never  SB: c
   b. Rarely  NN: a
   c. Sometimes  JA: a
   d. Often  GP: d

13. If yes, which one(s)?
   a. Deglutition Handicap Index (DHI)  SB: a
   b. M.D. Anderson Dysphagia Inventory (MDADI)
   c. Eating Assessment Tool (EAT-10)
   d. Swallowing quality of life questionnaire (SWAL-QOL)  GP: c

14. For what purpose?
   a. Prospective studies  SB: a, c, e
   b. Evolution of dysphagia over time  GP: a, d
   c. Measuring the patient’s feelings  GD: a
   d. Measurement of dysphagia intensity  GP: c
   e. Measurement of quality of life

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* a: FEESST (sensory testing). b: typically use if patient can not tolerate nasal instrumentation or if FEES/FEESST does not give enough information. f: esophagram (barium swallow).

b: I start and generally only use FEES/FEESST. If patient cannot tolerate nasal instrumentation or if FEES/FEESST does not give enough information, I will then use either VFSS or more typically an esophagram.

c: The pathology is not as important as seeing what the FEES/FEESST exam is telling me as I am doing the exam.

d: b: if there was aspiration/residue detected by FEES, it is followed by VFSS to further investigate what is the cause of aspiration or residue. d: for well-known patients at risk of aspiration.


f: PAS-5, Gugging swallow screen (GSS), Murray’s residue scoring.

g: FEES to track residue, VFSS to quantify residue.

h: The “seven days’ score” (homemade).

i: We attempt to check with both solid and liquid in all pathologies. However, choice of first food texture tested varies with pathology. Typically, the consistency of the first food tested is what the patient feels easiest to swallow.
Table 2
Literature analysis based on Levels of evidence and GRADE scores.

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Grade score</th>
</tr>
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<tbody>
<tr>
<td>Level 1</td>
<td></td>
</tr>
<tr>
<td>Large randomized trials with clear-cut results (and low risk of error)</td>
<td>Grade A</td>
</tr>
<tr>
<td>Meta-analysis or systematic reviews of randomized control trials</td>
<td>Established scientific evidence</td>
</tr>
<tr>
<td>Level 2</td>
<td></td>
</tr>
<tr>
<td>Small randomized trials with uncertain results (and moderate to high risk of error)</td>
<td>Grade B</td>
</tr>
<tr>
<td>Well-conducted non-randomized comparative studies</td>
<td>Provided studies are consistent</td>
</tr>
<tr>
<td>Cohort studies</td>
<td></td>
</tr>
<tr>
<td>Level 3</td>
<td></td>
</tr>
<tr>
<td>Individual case-control studies</td>
<td>Grade C</td>
</tr>
<tr>
<td>Comparative trials with historical cohort</td>
<td>Low level of evidence</td>
</tr>
<tr>
<td>Level 4</td>
<td></td>
</tr>
<tr>
<td>Comparative studies with significant bias</td>
<td>Expert opinion</td>
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<tr>
<td>Retrospective studies</td>
<td></td>
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<tr>
<td>Case series</td>
<td></td>
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<tr>
<td>Descriptive epidemiological studies (transversal or longitudinal)</td>
<td></td>
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<tr>
<td>No publication</td>
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</table>


deglutition process can be considered normal, thus avoiding the need to perform a VFSS to validate these findings [17].

The experts were questioned regarding the most sensitive exam to detect aspiration and pharyngeal residue. Amongst their answers, most proposed VFSS or FEES, or occasionally both modalities. Regardless of the investigation performed, it is undeniable that the ability to correctly interpret the results remains crucial to increase the exam’s sensitivity.

**Recommendation 2:** in order to highlight the presence of penetration or aspiration during the objective investigation of OD, it is recommended to perform either a FEES or a VFSS. FEES seems to be the more sensitive study, and should therefore be prioritized in centers lacking both of these exams (Grade C).

**Recommendation 3:** in order to highlight the presence of pharyngeal residue following deglutition, it is recommended to perform either a FEES or a VFSS. FEES seems to be the more sensitive study, while VFSS would allow the better quantification of the amount of pharyngeal residue (Grade C).

A score system can be employed as part of the objective evaluation of OD in order to quantify the dysphagia. Multiple scoring systems have been proposed in the literature, employed in conjunction with either FEES or VFSS. The most famous and probably the most employed one is the Penetration Aspiration Scale (PAS) [18], described in 1996 by Rosenbek et al. [19]. This score can be implemented during a FEES or VFSS. The majority of our experts use this scoring system frequently in order to better objectify the deglutition process.

**Recommendation 4:** it is recommended to objectify the quality of deglutition with a scoring system as part of the comprehensive objective evaluation of deglutition (professional agreement).

Multiple self-evaluation questionnaires exist, allowing for the evaluation of the patient’s swallowing quality of life or to monitor the efficacy of a treatment [20]. In contrast with the previously stated objective investigation assessment tools for OD, these self-evaluation questionnaires have the advantage of being inexpensive, fast and easily reproducible over time. However, one must remember that their sensitivity, specificity and positive predictive value is inferior to that of a FEES [21]. There are four self-evaluation questionnaires specifically dedicated to assessing OD quality of life: the Deglutition Handicap Index (DHI) [22], the Dysphagia Handicap Index (DHl) [23], the MD Anderson Dysphagia Inventory (MDADI) [24] and the SWAL-QOL [25]. A study by Timmerman et al. revealed that the SWAL-QOL had the best psychometric parameters and that the DHI was the easiest to use, with only 25 items and a uniform annotation process [26].

The experts seldom use self-evaluation questionnaires as part of the evaluation of OD. They are mostly employed for research purposes. The DHI is one of the most utilized questionnaires. Translation is an issue regarding these self-evaluation questionnaires. Indeed, they are often initially validated in English, thus needing to be translated and re-validated in different languages in order to be administered to an increased number of patients across the globe. Furthermore, literacy and education level of the target population are important considerations when administering self-evaluation questionnaires in order to avoid bias.

**Recommendation 5:** during research studies regarding deglutition, it is recommended to administer a self-evaluation questionnaire exploring dysphagia related quality of life (professional agreement).

**Disclosure of interest**

The authors declare that they have no competing interest.

**References**


