DOI: https://doi.org/10.5114/ait.2020.98490

Dysphagia.

Part 2: Dysphagia in intensive care patients

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Abstract

Dysphagia is a common problem among ICU patients. The frequency of dysphagia increases with age and sometimes symptoms can be difficult to recognise. But the consequences of dysphagia can be very serious, including aspiration and subsequently aspiration pneumonia. Therefore, knowing mechanisms and symptoms causing dysphagia is very important and should be well recognised. Proper diagnosis allows one to prevent further complications. However, both the diagnosis and treatment can be very complicated, especially among the patients who do not cooperate. In many cases, the implementation of an appropriate nutrition strategy and proper rehabilitation can alleviate the symptoms of dysphagia and avoid the most severe complications.

Key words: dysphagia, pathophysiology, symptoms, diagnostics, treatment, compensation.

Anaesthesiol Intensive Ther 2020; 52, 3: 233–236

Received: 16.02.2020, **accepted:** 15.06.2020

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RISK FACTORS

The most frequently mentioned risk factors for dysphagia in the intensive care unit (ICU) include admission for an acute neurological disease, previous neurological conditions, neuropathy/frailty in critically ill patients, and prolonged mechanical ventilation with endotracheal tube maintenance [1, 2, 7– 12]. Other factors influencing the incidence of dysphagia are age [7, 13–15], heart failure, postoperative pulmonary complications, sepsis, perioperative stroke, as well as dysphagia present prior to admission to the ICU, head and neck cancers and consequences of their treatment [8, 12, 14–17]. Less frequently mentioned risk factors for dysphagia include a high APACHE II or SOFA score, sex and comorbidities, such as arterial hypertension, kidney disease, diabetes, chronic obstructive pulmonary disease, myocardial infarction, heart failure, and nicotine addiction [1, 2, 6, 7, 13]. Among invasive procedures, trans-oesophageal echocardiography was associated with a higher incidence of dysphagia [6, 8, 12, 18].

The major risk factor for dysphagia in ICU patients, however, is endotracheal intubation; therefore, the concept of post-extubation dysphagia (PED) is increasingly used [3]. Endotracheal tube maintenance may promote dysphagia via several mechanisms. Apart from direct trauma to the larynx and its vicinity, the endotracheal tube may disturb the sensory reactions within the larynx, which, in combination with muscle weakness and impaired coordination between breathing and swallowing, may result in dysphagia [3, 6, 8, 12].

The factors that are causally related to the tracheal tube are its size and maintenance time. Dysphagia was more often observed in patients intubated for more than 48 hours with a larger tube size. While the time factor has been precisely defined, the risk associated with tube size is not. Narrow-lumen endotracheal tubes are preferred, which, however, may significantly hinder mechanical ventilation and airway clearance [3, 7, 13, 16].

Apart from endotracheal intubation, creation of a tracheostomy may also cause dysphagia, due to airway irritation and dyssynchrony between breathing, swallowing and coughing [3, 5, 7, 13, 19].

Enteral feeding via a nasogastric tube is another common risk factor for dysphagia in intensive care patients. In this case, the incidence of dysphagia was also associated with larger tube sizes [3, 16–18, 20, 21].

The younger group of ICU patients are victims of multi-organ trauma. In this group, a correlation between the incidence of dysphagia versus age and duration of mechanical ventilation was additionally observed. Dysphagia was by 37% more common in patients over 55 years of age, and prolonged mechanical ventilation increased the risk of dysphagia by 14% per each day of ventilation for > 48 hours [13–15].

CONSEQUENCES AND COMPLICATIONS OF DYSPHAGIA

The most serious complications of dysphagia in ICU patients, as well as in other groups of patients, are aspiration and aspiration pneumonia. The complications related to treatment and specific to intensive care include higher incidences of reintubation, tracheotomy and re-admissions [1, 2, 18, 21].

The consequences of dysphagia in the ICU also include the necessity to separate the respiratory and digestive passages by creating a tracheal fistula and nutritional gastrostomy.

Furthermore, an association between dysphagia and 28- and 90-day mortality was determined, estimated at 9.2% [2, 3, 6, 9]. Other effects of dysphagia include malnutrition as well as prolonged hospitalization and the resultant higher costs of treatment and worse prognosis, including higher incidences of discharges to institutionalised care facilities [1, 2, 17, 18, 21].

TABLE 1. Aspiration risk assessment

Aspiration risk factors
• Nausea or vomiting in the last 24 hours • Age > 80 years • Extubation > 48 hours after intubation • *Helicobacter pylori* infection, history of dysphagia or difficulty swallowing • Thickening drugs • Limited mobility of the head, neck, jaw and/or use of a cervical collar • Admission with known *Helicobacter pylori* infection or gastrointestinal disturbance • Limited or difficult gastric passage (chronic constipation, stomach congestion) • Home oxygen therapy • Lung transplantation or chronic lung disease • Worsening of neurological condition, decreased consciousness, stroke • Structural restrictions in the oral cavity (previous intubation, gastroesophageal tube) • Non-compliance with *nothing per os* (NPO) recommendations
Interpretation
• Each of the mentioned factors – 1 point • 1 point or more – NPO, nothing orally (also applies to drugs) • Further evaluation of the patient for dysphagia is needed

TABLE 2. Selected Swallow Assessment Tests

Type of test
• Bed-side swallowing evaluation (BSE) – study of water swallowing in various volumes at the patient's bedside • Gugging swallowing screen (GUSS) – test of swallowing with different volumes and densities of the test substance • Volume-viscosity swallowing test (V-VST) – swallowing test with different volumes and densities of the test substance + evaluation with a pulse oximeter
Modifications of the above tests in various centres
• Mann assessment of swallowing ability (MASA) • Dysphagia disorder survey (DDS) • Practical aspiration screening scheme (PASS) • Kuchi-kara Taberu index (KT index) • Practical assessment of dysphagia

Therefore, early diagnosis and treatment of dysphagia is crucial in preventing its negative outcomes. Unfortunately, most ICUs do not have protocols for the management of patients with dysphagia, and staff awareness of this problem seems insufficient. Numerous questionnaire studies on the diagnosis and treatment of dysphagia have recently been conducted; the publication of their results may change the perception of this problem [1–3, 6, 9].

DIAGNOSTIC PROCEDURES

The diagnosis of dysphagia in ICU patients should be multistage.

Firstly, screening for aspiration risk is suggested using the questionnaire presented in Table 1, in which each of the mentioned factors is scored 1. If the patient`s score is ≥ 1, he/she should not take any food or liquid by mouth; further diagnostic procedures are needed. Moreover, speech assessment is of importance, as dysphonia and dysarthria are symptoms that often accompany dysphagia [20–24].

The next step is to perform a bed-side swallow exam. Swallow tests are listed in Table 2.

Both the first and second step of assessment are commonly performed by nurses, usually 18–24 hours after tracheal extubation. Such an assessment of deglutition is believed to correlate well with instrumental tests, and its normal course may be sufficient to initiate oral nutrition [17, 23–27]. Furthermore, simple interventions, such as exercising the muscles of the mouth, brushing the teeth, evaluating the amount of saliva, and possibly massaging the salivary glands by nurses, may improve swallowing [17, 20, 23–27].

SWALLOW TESTS

The main purpose of a swallow test is to identify patients who require further diagnosis for dysphagia and to detect aspiration.

There are many varieties of swallow tests, depending on the volume and consistency of the test substance. They can be divided into two groups, those assessing spontaneous saliva swallowing (the Crary test) and those assessing deglutition following test substance administration.

The bed-side swallowing evaluation (BSE) is the simplest dysphagia test. The patient is given variable volumes of water (5–90 mL), starting with the smallest amount and increasing it if no swallowing difficulties are detected. If the patient presents symptoms of dysphagia, such as coughing or change in voice quality, the test should not be continued, and oral feeding should not be started. The assessment can be repeated by changing the consistency of food. The Gugging swallowing screen (GUSS) and the volume-viscosity swallow

test (V-VST) are the tests used most frequently to assess symptoms of dysphagia at various volumes and densities of the test substance. They are considered to be particularly useful when instrumental methods are not available. V-VST additionally uses pulse oximetry, where SpO_2 reduced by 3% in the absence of coughing allows to detect silent aspiration. Testing with different food consistencies also allows the introduction of compensatory techniques, consisting in adopting a specific body position while eating, which may enable oral feeding [22, 28–31]. The Evans test, developed for patients with tracheotomy, both mechanically ventilated and spontaneously breathing, deserves a special note [31–33]. To date, none of the swallow tests listed in Table 2 has been recommended as the standard, their sensitivities being similar (92–96%), and their use depending on local management algorithms [2, 3]. It should also be noted that most of the tests were designed for patients with neurogenic dysphagia after stroke [31].

It seems essential to be aware of the problem and to implement an aspiration prevention regimen, where the first step is to identify patients at risk for testing and further diagnostics.

When the risk factors are identified and the symptoms of dysphagia found during the bed-side swallow test, an instrumental examination is required to confirm the diagnosis.

INSTRUMENTAL TESTS

Instrumental examinations allow us to objectively assess the act of deglutition. Fibre optic endoscopic evaluation of swallowing (FESS), promoted by Langmore, is now considered extremely useful in ICUs and represents the gold standard in the diagnosis of dysphagia. Thanks to FESST, the structure of the larynx, its reactivity and the secretory activity of the oral glands can be assessed. The advantages of the method undoubtedly include its repeatability and that it can be performed at the patient's bedside. Modifications of the endoscopic examination with food stimulation are also used in the diagnosis of dysphagia. Flexible endoscopic evaluation of swallowing with sensory testing (FEESST) is an examination in which, after functional tests without food, the patient swallows foods of different consistencies under endoscopic control.

Moreover, the penetration and aspiration scale (PAS) presented in Table 3 assesses not only the risk of aspiration, but also the risk of re-intubation in some groups of patients, based on the fibre optic endoscopic dysphagia severity scale (FEDSS) [10, 36–38].

The rarely used video-fluoroscopic swallowing study (VFSS) is a modification of the oesophageal barium swallow test during which the patient swallows foods of various consistencies labelled with radiographic contrast while under X-ray [3, 5, 10, 27, 34].

TABLE 3. PAS scale – degree of contrast penetration into the respiratory tract [36]

Category	Score	Description
	1	Contrast does not enter the airways
Penetration	2	Contrast enters the airways, remains near the vocal folds, no residue
	3	Contrast above the vocal folds, visible residue
	4	Contrast at the level of the vocal folds, no residue
	5	Contrast residue remains at the level of the vocal folds
Aspiration	6	Contrast passes the glottis, no subglottic residue visible
	7	Contrast passes the glottis, visible residue in the subglottis, the patient responds – coughs
	8	Contrast passes the glottis, visible residue in the subglottis, the patient does not respond – no cough ("silent aspiration")

Score 1 – no symptoms of dysphagia, score 8 – the most severe complication of dysphagia, i.e. aspiration without coughing.

Instrumental examinations are not always fully available; nevertheless, no effort should be spared to perform them, as they enable the detailed identification of the mechanism causing dysphagia, which is important while panning the treatment.

TREATMENT OF DYSPHAGIA IN PATIENTS OF INTENSIVE CARE UNITS

In ICU patients, adaptive methods, consisting in changing the consistency of food and stimulating the receptors through their appropriate preparation, may be insufficient, while compensatory methods, or rehabilitation, requiring the patient's cooperation, may be difficult to apply. Therefore, other possibilities to improve the swallowing reflex are being sought. Neurostimulation and its variants, pharyngeal electrical stimulation (PES), repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (tDCS), have been gaining importance recently. PES is the most frequently used method, where a 10-minute stimulation cycle is carried out once a day for consecutive 3 days, and the increase in neuronal activity usually occurs approximately 30 minutes after the session. The stimulation improves the swallowing reflex at the central level by increasing the release of P substance into the saliva, and at the peripheral level by sensitizing neurons in the oral cavity and the oropharynx. This method is particularly effective in neurogenic dysphagia [39, 40].

Dysphagia appears to remain an underrated problem in intensive care. It is necessary to examine patients for dysphagia risk factors and to assess possible symptoms after removal of the endotracheal tube. Patients with symptoms of dysphagia should be further diagnosed and treated. The de-

velopment and application of a patient evaluation protocol as well as some, sometimes quite simple, interventions can help prevent complications, as well as improve the prognosis and comfort of patients treated in the ICU.

ACKNOWLEDGEMENTS

1. Source of funding: none.
2. Conflict of interest: none.

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