Review article

Recommendations and practices for dysphagia attention during the COVID-19 pandemic

Recomendaciones y prácticas para la atención de la disfagia durante la pandemia de COVID-19

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Abstract

Introduction: Coronavirus infection (SARS-CoV-2) leading to COVID-19 is highly contagious and its management may require hospitalization and ventilatory support. Healthcare providers are exposed to contagion during the diagnosis and treatment of dysphagia. Practices should be modified in relation to available resources and staff safety.
Methods: Recommendations issued by PAHO and from associations aimed at the study and treatment of dysphagia were collected, and the present work was designed to provide guidance on outpatient, hospital management, and follow-up of patients with COVID-19.
Relevance: Options are provided for diagnostic and treatment modalities, as well as for inpatient care, intensive care and possible post-hospital complications. These guidelines will serve healthcare providers to properly and safely manage dysphagia during a healthcare crisis such as the COVID-19 pandemic.
Conclusions: We recommend considering each case multidisciplinary and on the basis of the patient's individual circumstances and the availability of resources. Innovation, introducing telemedicine and other techniques are needed to resolve current difficulties and to produce new scientific evidence as well.

Keywords: SARS-CoV-2, COVID-19, dysphagia, recommendations.

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Resumen

Introducción: La infección por coronavirus (SARS-CoV-2) que lleva a la enfermedad COVID-19 es altamente contagiosa y su manejo puede requerir hospitalización y soporte ventilatorio. El profesional de la salud se encuentra expuesto al contagio durante el abordaje diagnóstico y tratamiento de la disfagia. Las prácticas deben modificarse en relación con los recursos disponibles y la seguridad del personal.

Métodos: Se recogieron las recomendaciones emitidas por la OPS y asociaciones encaminadas al estudio y tratamiento de la disfagia en varios países, y se diseñó el presente trabajo para proporcionar orientación sobre el manejo ambulatorio, hospitalario, y seguimiento de los pacientes con COVID-19.

Relevancia: Se proporcionan opciones para modalidades de diagnóstico y tratamiento, así como para la atención del paciente hospitalizado, de cuidados intensivos y posibles complicaciones posteriores a la hospitalización. Estas pautas orientarán al personal a atender la disfagia de manera adecuada y segura durante una crisis de atención médica, como la pandemia de COVID-19.

Conclusiones: Recomendamos considerar en forma individual y multidisciplinaria cada caso, basándonos en las circunstancias individuales del paciente y la disponibilidad de recursos. Se requiere innovación y la introducción de la telemedicina y otras técnicas para resolver las dificultades actuales, así como el desarrollo de nueva evidencia científica.

Palabras clave: SARS-CoV-2, COVID-19, disfagia, recomendaciones.

Introduction

Infection by a new strain of coronavirus (SARS-CoV-2) leading to the disease called COVID-19 ('CO' stands for corona, 'VI' for virus, and 'D' for disease), which affects the respiratory tract, was documented for the first time following the report of 27 cases of atypical pneumonia on December 31st, 2019, in Wuhan Municipality, Hubei Province, China.[1,2] By January 30th, 2020, with more than 9,700 confirmed cases in China and other 106 confirmed cases in 19 countries, the Director-General of the World Health Organization (WHO) declared a public health emergency of international concern.[1–3] On February 28th, the Mexican Government confirmed the first case of COVID-19 in a 35-year-old male, with a history of a trip to Italy.[4] Two weeks later, on March 11th, 2020, WHO declared it a pandemic and consequently health personnel are guided by international recommendations as well as recommendations by local authorities.[3,5] As of April 5th, 2,143 cases of COVID-19 have been confirmed in Mexico, while 94 deaths have been reported.[6] It is impor-

tant to consider the risk which health professionals are exposed to, as well as the protective measures to be taken in all branches of medicine. Due to the nature of their work, health professionals in speech therapy are significantly exposed to contagion during the physical examination, diagnostic approach and treatment of dysphagia. For this reason, the evidence of risk, recommendations issued by the Pan American Health Organization (PAHO) as well as those of other broadcasting bodies from different countries are reviewed.

Transmission and clinical features

Although its transmissibility rate is not yet well defined, COVID-19 is highly contagious. Transmission occurs through droplets and aerosols generated at the nose, mouth and throat (released during the sneeze and cough of an infected subject, traveling up to 2 meters away), which contact mucous membranes of the respiratory tract, eye apparatus or by direct inoculation of contaminated hands.[7–9] Viral excretion is typically higher when patient is symptomatic. However, there is evidence suggesting potential transmission during the incubation period, which has been estimated between 2 and 10 days.[10]

The most common clinical features include headache, fever, dry cough, fatigue, myalgias and dyspnoea.[2,5,8,11] The approximate period between the onset of symptoms and hospitalization has been reported between 0 and 11 days.[11] Other less common symptoms include the following: discomfort and aches, odynophagia, diarrhea, conjunctivitis, skin rashes, or loss of color in the fingers or toes. It has been reported that about 5 to 19% of patients may present fever-associated anosmia or ageusia as an initial symptom;[12] though, headache and fever remain to be critical clinical data for COVID-19 diagnosis.

Almost 20% of symptomatic patients will require hospitalization and even ventilatory support at intensive care units (ICU).[7] The high rate of patients that will require invasive intervention such as intubation, invasive, noninvasive or high frequency mechanical ventilation, tracheostomy and extubation should be considered. This may result in sequelae, oromotor disorders and dysphagia, which must be identified by healthcare providers.[13]

General protective measures

WHO, through PAHO, recommends using protective measures (Personal Protective Equipment, PPE) related to care level and contagion risk (Table 1).

Table 1. Protective measures in relation to care level and contagion risk

Case level	*Hand hygiene*	*Robe*	*Medical mask*	*Respirator (N95 or FFP2)*	*Goggles (eye protection or face shield)*	*Gloves*
Triage	x		x			
Sample collection for laboratory diagnosis	x	x		x	x	x
Suspected or confirmed COVID-19 case requiring admission to a health center and DOES NOT require an aerosol generating procedure	x	x	x		x	x

Continúa...

Case level	*Hand hygiene*	*Rob*	*Medical mask*	*Respirator (N95 or FFP2)*	*Goggles (eye protection or face shield)*	*Gloves*
Suspected or confirmed COVID-19 case requiring admission to a health center and DOES require an aerosol generating procedure	**x**	**x**		**x**	**x**	**x**

The authors of this paper propose to review the operational definitions, prior to patient care according to PAHO, which are set out below.[1] For this, clinicians must use experience and clinical judgment, commit to being in constant communication with colleagues or medical teams to exchange information and support each other; as far as possible, obtain information from the reference source (indirect interrogation), from the staff in charge or members of the multidisciplinary team, before any "face-to-face" direct interaction with the patient.[5,14]

Since COVID-19 disease is new, we recognize that every day we are researching and learning new things, as well existing procedures and guides today may be continually evolving and changing. It is everyone's responsibility to keep up with local policies and procedures on prevention, infection and control.[14] Prior to direct contact with the patient, it would be ideal to confirm the patient's status regarding COVID-19. For this, operational definitions must be established:[14]

Suspect case

1. A patient with an acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath), AND a history of travel to or residence in a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset;
   OR
1. A patient with any acute respiratory illness AND who had been in contact with a confirmed or probable COVID-19 case (see definition of contact) over the last 14 days prior to symptom onset;
   OR
2. patient with a severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath, AND requiring hospitalization) AND in the absence of an alternative diagnosis that fully explains the clinical presentation.[15]

Probable case

1. A suspect case for whom testing for the COVID-19 virus is inconclusive;
   OR
2. A suspect case for whom testing could not be performed for any reason.

Confirmed case

A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms. [15]

Contact

A contact is a person who experienced any of the following exposures during the 2 days before and the 14 days after the onset of symptoms of a probable or confirmed case:

1. Face-to-face contact with a probable or confirmed case within 1 meter and for longer than 15 minutes.
2. Direct physical contact with a probable or confirmed case.
3. Direct care for a patient with probable or confirmed COVID-19 disease without using proper personal protective equipment; OR
4. Other situations as indicated by local risk assessments.

Note: for confirmed asymptomatic cases, the period of contact is measured as the 2 days before through the 14 days after the date when the sample which led to confirmation was taken. [15]

High-risk procedures

Infection by inhalation of aerosols may occur during any procedure near the patient's nose, mouth or throat, including phoniatric, otolaryngologic, swallowing, and speech and language therapy, procedures.[7] The American Speech, Language and Hearing Association (ASHA) states that aerosol-generating procedures include (but are not limited to):[16]

- Dysphagia Care:
  - » Non-instrumental swallowing assessment, including structural and functional evaluation of the oral mechanism, testing oral reflexes (e.g., gag and cough reflexes) and clinical (bedside) administration of different diet and liquid consistencies.
  - » Instrumental assessment of swallowing, including fiber-optic endoscopic evaluation of swallowing (FEES) with or without sensory testing, and videofluoroscopic swallowing study (VFSS).
- Dysphagia treatment, which includes rehabilitative and compensatory approaches.
- Instrumental assessment of the voice via endoscopy with or without stroboscopy.
- Assessment and management of laryngectomy, including voice, restoration with voice prosthesis, and stoma care.
- Assessment and treatment of tracheostomies, with or without mechanical ventilation, including aspiration and adaptation of fonatory valve.
- Noninvasive ventilation such as high-flow nasal oxygen and nasal cannulae.

Generally speaking, the recommendation for Phoniatricians and Speech and Language Pathologists is not to perform the following procedures during the COVID-19 pandemic:

- Fiberoptic endoscopic evaluation of swallowing (FEES)
- Endoscopic evaluation of vocal function (neither rigid nor flexible endoscopic procedures)
- Assessment of gag reflex
- Voluntary coughing
- Cough reflex test

Cervical Auscultation

Cervical auscultation is a procedure that should also be avoided in COVID-19 suspected and confirmed cases. This recommendation is because SARS-CoV-2 may remain viable on inanimate surfaces for up to five days. In cases where

cervical auscultation is considered essential, the professional should use the stethoscope at the patient's bed and perform a proper cleaning of the equipment at the end of the procedure.[17]

Case assessment

In all cases, it is recommended to use personal protective measures (Table 1). After the initial evaluation, the risk inherent in each patient should be known, through communication with team members or previously make a video call to gather information regarding the patient's medical history (status of the SARS-CoV-2 test result, patient history, travel history, contacts with positive cases and current symptoms) and whether it is necessary; also, it is recommended to defer evaluation until diagnostic confirmation.

In the event that a modification of the clinical procedure cannot be made and PPE is not available, clinical interaction cannot be performed. It is also necessary to state in the medical record all modifications to the standard patient evaluation and management protocol by the healthcare provider.

In the evaluation and management of communication disorders and dysphagia, if a face-to-face assessment is required, a visual and perceptual examination should be performed at a distance of 2 m from the patient, paying attention to the characteristics of swallowing, perceptual changes in the voice, respiratory symptoms and pattern, inspection of the oral cavity (preserving the 2-meter distance), conservative assessment of swallowing with modification of food consistency, and considering an interaction time limited to 15 minutes.[9,18]

A. Patients at low risk of contagion

In this group we will consider patients who do not meet operational definitions for suspect, probable or confirmed cases. In these patients, the treatment of dysphagia may be the usual care with the main objective of helping the patient reach an adequate nutritional status.

Some authors consider including already-cured cases in this group.[7] There is evidence to support the presence of immunity after infection.[19] However, for the safety of the healthcare professional, already-cured patients should be considered as potential carriers of the disease.

B. Patients at moderate risk of contagion

In this category we can include COVID-19 patients in the recovery phase, as well as those who, without presenting data of acute respiratory infection, have anosmia and/or have a history of coexistence with infected patients. In these cases, high-risk procedures should be avoided as much as possible. If necessary, all protective measures used in the assessment of patients at high risk of contagion should be in place.

The nutritional condition of the patient should always be the highest priority. However, those in the recovery phase of COVID-19 may become weakened and require prolonged use of tube feeding or oral nutritional supplements. The risk of aspiration/penetration should be avoided as much as possible. Safe and easy-to-swallow consistency are recommended for as long as necessary, such as chopped and wet diet, puree or liquefied (texture levels 3, 4 and 5 according to the International Dysphagia Diet Standardization Initiative, IDDSI).[20]

C. Patients at high risk of contagion

This group comprises all the patients who meet the operational definition for suspect, probable or confirmed cases of COVID-19. If possible, an attempt should be made to carry out evaluation and treatment online, by telephone or by telemedicine,[3] that has proven its effectiveness at the areas of hearing and language.[21]

In case of assessing them in person, it is essential to use the full PPE, including eye and facial protection (Table 1). High-risk procedures should be avoided, and dysphagia evaluation limited to observing oral intake with texture levels 3, 4 and 5 of IDDSI.[20]

Once the risk of contagion is identified, the degree of approach required to modify, prioritize, and limit interaction is determined. It is considered an indicator of face-to-face care if there is a high risk of aspiration, choke, isolation due to communication needs, or inability to communicate current health needs that may affect the patient's ability to participate in the decision-making of consensual procedures.[9]

Considerations in the administration of oral drugs for the treatment of COVID-19 in patients with dysphagia

The Pharmacological Interactions Study Group at the University of Liverpool (Liverpool Drug Interactions Group) published a review on the various approaches used in the treatment of COVID-19 in patients with dysphagia.[22] We present the relevant aspects of these drugs in relation to this type of patients:

- Darunavir/cobicistat: Even if the manufacturer recommends not breaking down the tablets, a study with healthy volunteers showed that doing so does not significantly decrease the drug's concentrations.[23]
- Lopinavir/Ritonavir: The manufacturer does not recommend breaking down the tablets. If the patient cannot swallow them, using the drug in oral solution is suggested because if the tablet breaks, the drug's concentration can be reduced by 45%.[24] The oral solution should be prepared in a proper concentration, the feeding tube or nasogastric tube should be rinsed with milk (not water).
- Favipiravir: Tablets can be chopped and mixed with liquids.[25]
- Chloroquine: It is preferable to avoid breaking the tablets. Though, these can be chopped and mixed with ham, honey, pasteurized yogurt or similar meals.[26] In its syrup presentation, its contents of propylene glycol should be considered; thus, despite no indications are specified in this regard, it must be considered in relation to feeding tubes.[27]
- Hydroxychloroquine: The manufacturer does not recommend breaking the tablets.[25] Nevertheless, some sources suggest it can be done.[22]

Assessment of dysphagia in outpatients with diagnosed or suspected COVID-19

Considering the background of other countries and understanding that some health disciplines, owing to the type of intervention they carry out, have greater contact with oral and respiratory secretions, as it is the case of speech therapists, otolaryngologists, respiratory therapists, nurses, ophthalmologists and dentists; it is suggested: [3]

Complying with the general recommendations of the National Secretariat of Health and the particular recommendations of each institution, if they were issued by teams of experts in the field, since the particularities of the patient population are not the same in each health center. [3]

It is advisable to restrict face-to-face speech therapy consultations to essential cases. Incorporate this care modality gradually.[28] ASHA encourages discussing the risks of providing patient and provider services with employers to determine the best course of action for in-person services.[29] While patient's well-being is paramount, on ethical issues ASHA recommends: "no clinician has an ethical obligation to work in physical danger in order to provide client care".[29]

Suspend outpatient or office treatment care. Promote the continuity of treatments through tele-therapy or tele-rehabilitation[3], whenever the pathology makes it possible. In those patients who do not require face-to-face care, telemedicine care will be prioritized.[28]

In patients diagnosed or suspected of COVID-19, unless strictly necessary, the evaluation will be conducted at an appropriate, approved site and in the knowledge of a local organization or health care authority. If possible, aerosol-generating procedures should be deferred.

VFSS is not recommended. In the absence of PPE, the change of voice prostheses, fonatory valves or tracheal stomata, as well as the change and cleaning of tracheostomy endocannulas by the phoniatrician, or speech and language pathologist, are deferred until reduction of transmission.[9]

Food or thickeners used for evaluation or therapeutic program of patients with suspected or confirmed COVID-19 (including leftovers and/or packaging) should be discarded right after use within the isolation area and if restricted monitoring and monitoring the feeding involves the exposure of bodily fluids, it must be considered if the activity will be made by keeping the physical estrangement.[9,17]

Clinical evaluations are generally recommended only for patients with oropharyngeal dysphagia, avoiding any instrumental examination. Evaluation of oropharyngeal dysphagia should be performed in conscious, fully awake patients with stable respiratory status and optimal PaO2/FiO2. The patient should be placed in the correct position, remove Monaghan masks, oxygen masks, and use nasal cannulaes (2-3 L/min) to provide oxygen. Over the volume-viscosity test, the patient's vital signs and pulse oximetry should be monitored throughout the procedure.[14]

Clinical evaluation procedures (potentially aerosol-generating procedures):

Each individual case should be analyzed, considering the risk-benefit of these procedures. It is recommended to limit them to patients at low risk of contagion, and only if strictly necessary, for patients at moderate risk of contagion.

For clinical evaluation of oropharyngeal dysphagia with clinical observation and volume-viscosity testing, the following steps should be considered:

1. Establish whether the patient refers or presents clinical signs or symptoms of oropharyngeal dysphagia, be aware that spontaneous coughing could generate aerosols and interfere with evaluation, respect the safety distance of 2 meters from the patient and use protective equipment (Table 2).[18]

Table 2. Clinical signs of dysphagia

• Clinical signs of dysphagia
• Respiratory tract infections
• Respiratory impairment after oral intake
• Wet voice
• Dysphonia (weak, opaque, rough or hoarse voice), occurs in approximately 76% of patients
• Inefficient, weak or absent cough
• Clinical or silent aspiration (related to vocal cord adduction)
• Difficulty in the oral phase (tongue propulsion, increased oral residues)

2. If necessary, the use of the volume-viscosity test to assess the safety and efficacy of swallowing should be explored. Optimal bolus volume and viscosity should be selected for each patient at risk of oropharyngeal dysphagia. The volume-viscosity test is a validated clinical assessment tool that uses different volumes (5, 10 and 20 ml) and viscosities (nectar, liquid and pudding) to evaluate clinical signs of swallowing efficacy and safety, with a diagnostic sensitivity and specificity for oropharyngeal dysphagia of 0.94 and 0.88 respectively, and high reliability, with a kappa value of 0.628 (ic 95% x 0.45–0.78).
3. The safety of the swallowing of the patient and the safety of the examiner should be prioritized, using the appropriate protective equipment and testing as quickly as possible.[14]

Yale Protocol

The Yale Swallowing Protocol is performed by asking the patient to swallow 3 ounces (90 ml) of water in slow, steady, sequential gulps without stopping. This should be done in a vertical position, 80º to 90º (or as high as it is tolerated > 30 °). Discontinuation of intake due to coughing or choking is assessed during or immediately after finishing the swallowing.

A PASS is considered as a result if the patient can drink the 3 ounces of water completely and uninterruptedly without showing signs of aspiration, coughing or suffocation, either during or immediately after ingestion. FAILURE is considered the inability to drink the full 3 ounces in sequential gulps due to stopping intake or showing signs of aspiration either during or immediately after completion.[30]

Addressing dysphagia in hospitalized patients with diagnosis or suspicion of COVID-19

Hospitalized patients should be evaluated on nutritional status, oral health status, dentition and masticatory function history, anamnesis and scales (MUST, NRS, MNA-sf, OHI-s, TOMASS, swallowing-breathing coordination and fatigue clinically evaluated), in conjunction with the hospital's nutrition and dentistry service.

Nutritional assessment (MUST -for adults-, NRS 2002 - hospitalized, or MNA-sf-elderly) is recommended 48 hours after hospital admission for all patients.

If the case arises, in order to decide the feeding route in patients with severe respiratory difficulty with suspected or confirmed COVID-19, it is recommended to place a nasogastric tube until respiratory stabilization, since breathing-swallowing coordination is a fundamental factor in the protection of the airway.[3,17]

Recommend compensatory strategies instead of active treatment, always under the following question: Can the safety and effectiveness of liquids and solid foods swallowing be improved?

In order to obtain favorable results, the following recommendations should be taken into account:

- Promote self-feeding and encourage the patient to be autonomous to eat and drink. If the patient needs help, the person in charge of doing so must wear full protective equipment (remember that these patients are at risk of aerosol generation).
- Maintain the sitting position with the legs at 90 degrees from the torso in the midline position, if possible, by keeping it reclined at 45 degrees to reposition the airway in relation to the esophagus, considering that the bolus could be directed away from the upper part of the airway which could reduce the risk of penetration / aspiration during swallowing.
- Manage the correct posture during meals, with the chin down when necessary. If the patient's situation permits, remove Monaghan masks, oxygen masks and use nasal tips (2 - 3 L / min) to provide oxygen therapy during meals and hydration periods.
- Reduce the volume of fluid intake if the patient shows signs of aspiration with water.
- For hydration, use the optimal viscosity as recommended and based on the results of the volume-viscosity test. Adapt solid foods in all patients with oropharyngeal dysphagia according to triple adaptation (texture, caloric and protein content, pleasant taste). Select the optimal texture according to the chewing and swallowing capacity of the patients, and calorie and protein content according to MNAS-f in the elderly, or MUST or NRS in adults.[20]

– If it has already been established that the patient can drink safely, the use of oral nutritional drinks is preferred. This is the most efficient approach in severely debilitated patients to prevent malnutrition. When patients improve, their limited condition and slow recovery should be considered. When oral enablement is required, the potential for slow recovery and patient preferences should be taken into account.
– Ask the patient to take individual sips at a time or provide it that way if assistance is required.
– Perform liquid swallowing after solid ingesting.
– It should not be forgotten that communication with some patients is difficult, resulting in greater vulnerability associated with the understanding of medical needs, and has an impact on the ability to participate in decisions about their rehabilitation.
– If the patient requires enteral nutrition, it should not be combined with oral intake since the risk of aerosol generation is remarkably high; it is recommended to place a nasogastric tube and postpone the placement of a percutaneous endoscopic gastrostomy.[14]

The following strategies can be applied to improve swallowing during hospitalization:

- Compensatory maneuvers: forced swallowing; double swallowing; Masako's maneuver; Mendelssohn's maneuver.
- Postural techniques: Anterior neck flexion; rotation of the head toward the injured side in case of chordal paralysis; supraglottic maneuver; forced swallowing maneuver or effort swallowing.
- Vocal cord adduction exercises and others such as Shaker's maneuver, which favor the opening of the upper esophageal sphincter; glottic closure and strengthening of the laryngeal levator muscles.[31]

Critically ill patients

In ICU, it is recommended assigning an exclusive professional to care for suspected or infected patients with COVID-19. As well, a redistribution of the team is suggested in order to minimize circulation and exposure between patients of different risk groups.[17]

For critical patients, including stroke units and chronic patients, the continuation of care for the maintenance of vital stomatognathic functions is suggested; this includes (taking extreme hygiene and safety measures) the management of saliva swallowing, secretion management, evaluation and swallowing treatments, communication for basic needs.[3] Complicated COVID-19 patients may require prolonged intubations, so a high incidence of myopathy, dysphonia, and post-extubation dysphagia is expected.

Patients who remain in ICUs for more than 48 hours should be considered at risk of malnutrition, so nutritionists/dietitians should be involved early in multidisciplinary management and provide individualized nutritional therapy.

Tracheostomy patients

Intervention in tracheostomized patients (endotracheal aspiration, deflation of the cuff, adaptation of devices such as speech and oral training valves) should be performed when the test for SARS-CoV-2 is negative.[17] If necessary, it should be discussed with the multidisciplinary team to assess the best time to perform the interventions with all the protective measures to be used in patients at high risk of contagion.

In patients who underwent tracheostomy, the clinical swallowing examination for oropharyngeal dysphagia with the volume-viscosity test should always be performed with the cuff inflated to minimize coughing and aerosol generation. The use of a dye to improve the diagnosis of aspiration should also be considered. If they are self-contained for feeding, the cuff can be deflated during meals. The patient with a tracheostomy who still needs respiratory or mechanical assistance should not be fed orally.[14]

Post-extubation condition

It should be noted that post-extubation oropharyngeal dysphagia may affect up to a third of patients and lead to serious complications such as aspiration pneumonia, reintubation and mortality.[14] It is common in intensive care units reaching 50% of patients in a 2018 systematic review.[32]

It is recommendable to examine extubated patients with signs or symptoms of oropharyngeal dysphagia from day 1 of extubation with the volume-viscosity test, repeating it at different times.[14]

It is also very important to identify the following clinical signs of intubation trauma as they are also of interest for comprehensive phoniatric treatment:

- History of recurrent failed extubation.
- Stridor.
- Dysphonia: A choppy or taut voice could be the result of vocal cord paralysis. 21% of patients may develop vocal cord paralysis after extubation.[28] A dull or muffled voice may indicate edema.
- Patients complaining of sore throat or pain when swallowing (odynophagia).

It should be considered that 90% of patients has some degree of laryngeal injury after extubation, with less serious injuries being the most com-

mon. Some patients will have long-term consequences, such as stenosis or tracheomalacia.

According to Brodsky *et al.*,[32] laryngeal injuries are more likely to occur in those who were intubated for a longer time, for example, 5-10 days (see Table 3).

Table 3. Laryngeal injuries according to Brodsky *et al.*

Laryngeal injuries
• Edema
• Granuloma / granulation tissue
• Vocal paralysis
• Mucosal injuries
• Vocal cord hypotonia
• Glottic / subglottic stenosis
• Subglottic mucosal oedema
• Arythenoid luxation
• Ulceration

The presence of dysphagia after extubation is considered multifactorial and there are several mechanisms already identified such as direct trauma to the structures, which could affect structural integrity, reduce glottic closure and compromise the protection of the airway. Muscle weakness from neuromyopathy or decreased sensory function and airflow could result in silent aspiration, gastroesophageal reflux and asynchrony between swallowing and breathing.

Conclusions

The COVID-19 pandemic has marked a time in the history of medicine in which a transformation is being generated in the protocols for diagnosis, treatment, use of resources, guidelines for the protection of health personnel, as well as in society itself. In the field of professionals in voice, speech, swallowing and language disorders, a change is required in the perspective of the mode of assessing and caring, prioritizing, modifying and limiting the approach, methodology and use of resources according to the situation of the environment and individualization of the patient's situation.

A physical examination of the oral cavity, nostrils, respiratory tract, clinical and instrumental evaluation of swallowing, voice, speech and language, as well as therapeutic management of tracheostomy and tracheal stoma, are considered as procedures with high risk to generate aerosols; Therefore, its performance, as well as other therapeutic processes, should be limited during the pandemic —and most likely to keep them for a time not defined yet— as well as continue to use personal protective equipment in our daily actions.

The need for innovation and the introduction of technology through telemedicine and other techniques to resolve current difficulties, as well as the development of new scientific evidence, is imminent.

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