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Original Article

Post-Extubation Swallowing Function in Critical Patients with and without COVID-19 During the Pandemic

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ABSTRACT

Previous research has described swallowing disorders in critical hospitalized patients who require intubation and mechanical ventilation. In the context of the pandemic, it is fundamental to investigate the severity of dysphagia in patients suffering from COVID-19. This study aimed to analyze the characteristics of the swallowing function in extubated critical patients with and without COVID-19. A retrospective cohort study was carried out, considering a convenience sample of 43 patients over the age of 15 years, hospitalized at the *San Juan de Dios* Hospital between June 1st and August 31st, 2020, and intubated, with and without the diagnosis of COVID-19. Of 43 patients, 22 were diagnosed with COVID-19 and were intubated for significantly more days when compared with those without COVID-19 (p=.002). Immediately following tracheal extubation, 90% of the sample was diagnosed with dysphagia. There was no significant difference in the FILS scores nor significant association in the severity of dysphagia between patients with and without COVID-19. Ten days post-extubation, there were no significant differences in the FILS score between both groups. The FILS scores increased significantly in the COVID-19 (p=.016) and non-COVID-19 (p=.004) patients after 10 days of extubation. Additionally, there were no statistically significant differences in the FILS score and dysphagia severity between critically ill patients with and without COVID-19, although there was a high prevalence of dysphagia in both groups, which could be associated with endotracheal intubation and endotracheal tubes. The incorporation of speech and language pathologists into Critical Care Units is essential. Moreover, it is recommended that further research is carried out in this field.

Keywords:
Coronavirus infections; Intratracheal intubation; Deglutition; Deglutition disorders; Chile

Deglución post extubación de pacientes críticos con y sin diagnóstico de COVID-19 durante la pandemia

RESUMEN

Estudios previos han caracterizado la disfagia en pacientes críticos hospitalizados que requieren intubación y ventilación mecánica invasiva. A raíz de la pandemia COVID-19 es necesario conocer las características deglutorias de pacientes diagnosticados con la enfermedad para su manejo. El objetivo de este estudio es analizar las características deglutorias de pacientes críticos extubados con y sin diagnóstico de COVID-19. Se llevó a cabo un estudio de cohorte retrospectivo con una muestra a conveniencia de 43 sujetos mayores de 15 años, ingresados al Hospital San Juan de Dios (Santiago, Chile) entre el 01 de junio y el 31 de agosto de 2020, intubados con o sin diagnóstico de COVID-19. Del total de sujetos, 22 padecieron de COVID-19 quienes estuvieron significativamente más días intubados que aquellos sin la patología (p=0,002). Inmediatamente posterior a la extubación orotraqueal, más del 90% de la muestra presentó disfagia. No hubo diferencia significativa en el nivel *FILS* ni asociación significativa en el grado de severidad de la disfagia entre sujetos con y sin COVID-19. Tampoco hubo diferencia significativa en el nivel *FILS* entre los grupos a los 10 días post-extubación. El nivel *FILS* a los 10 días aumentó significativamente en aquellos sujetos con COVID-19 (p=0,016) y sin COVID-19 (p=0,004). En la muestra, el nivel *FILS* y grado de severidad de la disfagia de los pacientes con y sin COVID-19 no mostraron diferencias estadísticas, siendo alto el porcentaje de disfagia en ambos grupos, lo que se podría asociar a la intubación orotraqueal y al tubo orotraqueal. Es necesaria la incorporación del fonoaudiólogo dentro de los equipos de Unidades de Pacientes Críticos para el manejo de los pacientes con COVID-19 y disfagia. Además, se recomienda continuar con más estudios en el área.

Palabras clave:
Infecciones por coronavirus; Intubación intratraqueal; Deglución; Trastornos de deglución; Chile

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INTRODUCTION

SARS-CoV-2 is a respiratory virus belonging to the coronavirus family, which causes COVID-19 disease. COVID-19 progresses quickly and presents an array of clinical manifestations such as digestive symptoms, general malaise, fever, headache, cough, and respiratory distress. This pathology can evolve into severe pneumonia, and subsequently into acute respiratory distress syndrome, which requires oxygen therapy and on occasion respiratory support. In these cases, patients may present dyspnea, tachypnea, oxygen desaturation, and disturbances in the ratio of arterial oxygen partial pressure (PaO2), among other respiratory dysfunctions, which may lead to hypoxia and multi-organ failure (Saldías Peñafiel et al., 2020). Patients whose disease progresses into the aforementioned conditions require artificial ventilatory support through invasive mechanical ventilation (IMV). Moreover, those conditions could lead to a critical state, and in some cases cause death (W. Zhang et al., 2020). In Wuhan, China, as of March 4, 2020, 80,409 cases of COVID-19 were reported, of which approximately 3.2% required intubation and IMV at some point in the course of the disease (Meng et al., 2020; Yang et al., 2020).

IMV is a pulmonary support strategy that is essential to improve oxygenation and clinical outcomes in COVID-19 patients (Yang et al., 2020; L. Zhang et al., 2020). It is an aggressive and frequent procedure in Critical Care Units (CCU), especially in Intensive Care Units (ICU), and is associated with high mortality and morbidity (Vera et al., 2020). The use of an artificial airway is needed to carry out this procedure, either through a tracheostomy or through endotracheal intubation (EI), which in turn could be nasotracheal (NTI) or orotracheal (OTI). In OTI, an endotracheal tube (ETT) is introduced via the oral cavity and into the trachea, passing through the vocal folds. The ETT is in direct contact with the mucosa at the oral, pharyngeal, and laryngeal levels, and may lead to disturbances in the upper airway tissue. These could include focal ulcerations, localized inflammatory processes, and vocal fold lesions (Zuercher et al., 2019). Additionally, OTI may reduce the motility and sensitivity of the oro-pharyngolaryngeal region, hindering active laryngeal elevation and decreasing the passive opening of the upper esophageal sphincter (Reiter & Brosch, 2012), which in turn could affect the process of deglutition. Swallowing, or deglutition, is defined as the "coordinated and synchronized neuromuscular activity between different muscle, bone, and cartilaginous structures, which are controlled by the central and peripheral nervous systems, and whose objective is the transport of the alimentary bolus from the oral cavity to the stomach safely and effectively" (Cámpora & Falduti, 2019). Guan et al. (2020) mention that in severe respiratory failure, prolonged use of ETT becomes necessary, with a greater risk of complications like dysphagia. In this sense, OTI can delay the start of oral feeding, increasing the risk of malnutrition, dehydration, and lung diseases such as aspiration pneumonia (Oliveira et al., 2018). This results in more hospital resources being used, higher treatment costs, more bed days in the CCU, deterioration of the patient's health, and a greater risk of death (Altman et al., 2010).

The presence of dysphagia in critical hospitalized patients who require the use of OTI without COVID-19 has been proved in several studies, which concur that the longer the use of IMV, the higher the incidence of dysphagia after tracheal extubation (TE) (Chen & Qian, 2020; Fernando & Seely, 2020; Schefold et al., 2017). In this regard, it has been reported that a third of intubated patients with acute respiratory distress syndrome (ARDS) present dysphagia (Brodsky et al., 2017; Xu et al., 2020). Furthermore, it has been observed that in people with OTI for more than 48 hours, the prevalence of dysphagia increases by 56% compared to those who require OTI for a shorter period, with 25% of them presenting silent aspiration (Frajkova et al., 2020).

Regarding dysphagia in people with COVID-19 who require OTI, an observational, descriptive, and retrospective study that analyzed the pathology after extubation in patients diagnosed with COVID-19 concluded that 72% of the sample required re-intubation, and of them, 26.9% presented dysphagia after TE (Bordejé Laguna et al., 2021). Another study on patients with COVID-19 mentions that 60% of the patients presented dysphagia after TE (Yılmaz et al., 2021). Additional research shows a high association between COVID-19 and the presence of swallowing disorders (Martin–Martinez et al., 2021; Osbeck Sandblom et al., 2021). In particular, a high prevalence of dysphagia and malnutrition has been reported in patients hospitalized in COVID-19 wards, secondary to OTI, IMV, and the use of a nasogastric tube (NGT), in addition to other complications secondary to COVID-19 such as polyneuropathy, myopathy, and neurological disturbances that directly affect swallowing (Martin–Martinez et al., 2021). In this context, Fernández R. et al. (2020) state that patients with COVID-19 could present feeding difficulties due to factors such as increased respiratory effort, the use of ventilatory devices, neurological compromise, and swallowing disorders associated with tracheal extubation.

Osbeck Sandblom et al. (2021) carried out a case series study on patients with severe COVID-19 who required OTI for an average of 25 days, where they found that 92% presented an accumulation of secretions, 100% post-swallowing residue both at the level of the valleculae and the hypopharynx, 44% showed signs of silent

aspiration, and 76% presented disturbances in vocal fold mobility, with vocal fold erythema and arytenoid edema in 60% of the cases. Concerning respiratory effort, an relationship has been observed between COVID-19, reduced lung function, and the presence of pulmonary fibrosis, which would impair the coordination between swallowing and breathing, increasing the risk of bronchial aspiration (Ghannouchi et al., 2020).

With regard to the use of ventilatory devices, a study in patients with COVID-19 who presented a diffuse bilateral alveolar lesion accompanied by myxoid exudate showed that they quickly progressed into respiratory failure. This means that the majority of the patients required the use of IMV, with a longer time using OTI compared to patients with milder respiratory failure (Yang et al., 2020). To this day, the results associating the impact of COVID-19 with the severity of dysphagia after extubation have been variable. However, previous research on non-COVID-19 patients who required IMV report that dysphagia is a frequent consequence of OTI (Brodsky et al., 2017; Frajkova et al., 2020; Kim et al., 2015).

On the other hand, it has been observed that COVID-19 can have neurological consequences on swallowing and breathing, affecting both functions at the central level, which in turn might worsen the symptoms of the mechanical dysphagia caused by OTI (Ezpeleta et al., 2020). A case series study reports that survivors of this disease may present a disruption in airway protective mechanisms, with polyneuropathy contributing to the deterioration of swallowing and laryngeal function (Dziewas et al., 2021). Despite the above, patients with severe COVID-19 who have an indication of OTI do not necessarily receive speech therapy during the period with IMV. Nevertheless, most will likely require a clinical evaluation and intervention of swallowing following their critical hospitalization period (Silva Freitas et al., 2020).

Given the exposed information, it is fundamental to generate data about this topic, in order to know the characteristics of swallowing in critically ill patients with and without a diagnosis of COVID-19 who require OTI. In this line, the objective of this study is to know and categorize, using the Food Intake Level Scale (FILS), the swallowing performance of critically ill patients with and without a diagnosis of COVID-19, immediately after and 10 days after tracheal extubation.

METHOD

Design

This is an analytical, observational, retrospective, cohort study.

Population and sample

The population of the study consisted of patients over the age of 15 years, admitted to the *San Juan de Dios* Hospital in Santiago, Chile, and requiring OTI, with or without a diagnosis of COVID-19 confirmed by PCR test. The sample was selected by convenience between June 1st and August 31st, 2020 at the same hospital.

Inclusion Criteria

The following inclusion criteria were considered: patients over the age of 15 years admitted to the CCU of the *San Juan de Dios* Hospital in Santiago, Chile between June 1st and August 31st, 2020, with or without a diagnosis of COVID-19 confirmed by PCR, and who required OTI during their hospitalization.

Instruments

The FILS scale (Kunieda et al., 2013) was used for classifying the level and degree of severity of the dysphagia. This scale consists of ten levels, where levels 1 to 3 correspond to severe dysphagia, levels 4 to 6 to moderate dysphagia, and levels 7 to 10 to mild dysphagia. Level 10 represents the absence of this condition.

Procedures

Firstly, the responsible researcher requested a list of the patients who were hospitalized between June 1st and August 31st, 2020 and who required OTI, to the hospital's Data Management Unit, in order to perform a retrospective analysis. Secondly, the clinical records of the patients were requested in order to register the data in a password-protected database, including the national identity number and/or clinical record number of the patients; this was named "Database A". The Microsoft Excel ® 2016 software was used to create the database. Thirdly, the research team analyzed the clinical records to extract the data required for "Database A" of patients admitted up until August 31, 2020. The clinical records were analyzed until the final extubation of the patient or their demise before the extubation. "Database A" contained categorical variables like gender, diagnosis on admission, COVID-19 diagnosis, OTI, self-extubation, description of the weaning procedure, tracheal extubation, speech-language pathology intervention during the OTI period, and level/degree of dysphagia after extubation according to the FILS scale. Additionally, it included the numerical variables of age, date of admission, date

of discharge or death, number of days of hospitalization, date of first clinical assessment by a speech-language pathologist (SLP), number of clinical swallowing evaluations by an SLP, number of speech-language therapy sessions for swallowing rehabilitation, number of days receiving swallowing therapy by an SLP, number of self-extubations, number of re-intubations, number of the first ETT, number of the second ETT if applicable, number of the third ETT if applicable, number of the fourth ETT if applicable, number of attempted tracheal extubations, and total number of days intubated. After completing "Database A" with all the required information, the responsible investigator anonymized it by assigning a new identification number to each patient, thus eliminating the national ID and clinical record number to create a new database called “Database B”. Therefore, “Database A” was automatically deleted to protect the identity of the participants. Lastly, the research team analyzed the information using descriptive and analytical statistics.

Data Analysis

The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 24 (IBM Corp, 2021). Descriptive statistics were used to determine the variables of analysis according to percentage and frequency data. In addition, a description of the measures of central tendency was performed for the numerical variables, analyzing them according to their distribution. Subsequently, association and difference tests were carried out according to the data distribution, in order to establish the use of parametric and/or non-parametric tests, considering a p-value equal or inferior to 0.05, and a confidence interval of 95%. Finally, a Chi-square analysis was applied using 2x2 contingency tables, with a p-value equal or inferior to 0.05 and a confidence interval of 95%.

Ethical Considerations

“Database A” was deleted immediately after the anonymization of the research subjects for “Database B”. This study was approved by the Scientific Ethics Committee of the *San Juan de Dios* Hospital in Santiago of Chile, with the identification “protocol No. 90, version 1”. Informed consent was not provided as it was a retrospective case-control study.

RESULTS

Data Collection

The Data Management Unit had records for 180 patients who appeared as intubated within the period. The clinical records were requested from the Archives Unit, with the subsequent exclusion of 137 subjects from the analysis for not meeting the inclusion criteria of the study. Table 1 describes the information about the selection of the sample.

Table 1. Selection of the final sample for analysis.

	Frequency	%
Total subjects reported within the period	180	100.00
Total subjects excluded from the analysis	137	76.11
Tracheotomized post-extubation within the period	46	25.56
Passes away while intubated within the period	30	16.67
Not intubated	7	3.89
Not possible to recover clinical record	6	3.33
Referred to another institution while intubated	4	2.22
Other (previous admission, without a clinical assessment by SLP, etc.)	44	24.44
Final sample	43	23.89

Research Subjects

The sample consisted of 43 subjects (17 women and 26 men). Of these, 22 were diagnosed with COVID-19 during their hospitalization and before the post-extubation clinical assessment of swallowing by an SLP (see Table 2). The median age of the subjects was 56 years (see Table 3). It should be noted that in the group of patients diagnosed with COVID-19 the ratio between men and women was 2:1, while in the group of patients without the virus the number of men and women was similar. Regarding the diagnoses at admission, the most common cause for both groups was respiratory (53.5%). In addition, the analysis showed

that 7% of the subjects died during their hospitalization, after being extubated. Details are presented in Table 2.

Table 2. Description of the categorical variables of the subjects in this research.

	Total Sample		COVID-19 (+)		COVID-19 (-)	
	Frequency	%	Frequency	%	Frequency	%
PCR results						
Total	43	100.00	22	51.16	21	48.84
Gender						
Female	17	39.53	7	16.28	10	23.26
Male	26	60.47	15	34.88	11	25.58
Diagnosis at admission						
Respiratory	23	53.49	17	39.53	6	13.95
Digestive	3	6.98	1	2.33	2	4.65
Sepsis	2	4.65	1	2.33	1	2.33
Loss of Consciousness	3	6.98	0	0.00	3	6.98
Hernia	2	4.65	1	2.33	1	2.33
Neurological	1	2.33	0	0.00	1	2.33
Cardiovascular	3	6.98	1	2.33	2	4.65
Neoplasia	1	2.33	0	0.00	1	2.33
Trauma	1	2.33	0	0.00	1	2.33
Other	4	9.30	1	2.33	3	6.98
Deceased during hospitalization						
Yes	3	6.98	1	2.33	2	4.65
No	40	93.02	21	48.84	19	44.18

Medical History of the Sample

The measure of central tendency used for the description of numerical data was the median, since most of the data were non-parametric. The median for the length of the hospital stay was 28 days, the median for OTI was 12 days, and the median for the number of ETT was 8.5. The details of the numerical variables can be found in Table 3. It is important to mention that 8 subjects required re-intubation with a median ETT number of 8.5, mainly due to respiratory failure, 6 of whom had COVID-19. The number of days with OTI for the subjects with the virus was higher than for those without the pathology, with the medians being 11 and 6 days, respectively. An analysis was carried out using the Mann-Whitney test to determine the difference. The test showed that the subjects diagnosed with COVID-19 spent significantly more days intubated compared to those who did not suffer from the disease (U=111.500, z=-2.914, p=0.002). On the other hand, 10 patients (7 with a diagnosis of COVID-19 and 3 without it) received speech-language rehabilitation for non-nutritive swallowing during the OTI period.

Table 3. Description of the numerical variables of the research subjects.

	Age	Days of hospitalization	Total days with OTI *	Number of ETT**	FILS level post-TE ***	FILS level 10 days post-TE***
Mean	55.33	35.91	9.47	8.12	5.79	6.97
Median	56.00	28.00	12.00	8.50	6.00	8.00
Standard D.	15.86	32.42	6.17	0.47	3.11	2.69
Skewness	-0.95	2.83	0.41	-1.02	-0.06	-1.13
SE of skewness	0.36	0.36	0.36	0.36	0.36	0.42
Range	54.00	176.00	20.00	1.50	9.00	9.00
Minimum	27.00	7.00	1.00	7.00	10.00	1.00
Maximum	81.00	183.00	21.00	8.50	10.00	10.00
IQ Range****	27.00	26.00	9.00	0.50	6.00	3.00

* Orotracheal intubation
** Endotracheal tube
*** Tracheal extubation
**** Interquartile range

Level of the FILS scale and degree of severity of the dysphagia after tracheal extubation

A clinical assessment of swallowing was performed by an SLP between the first and seventh days after the tracheal extubation (TE) of the subjects, with the median of the clinical evaluations being day one. Regarding the level of the FILS scale, the median of the sample was level 6, corresponding to moderate dysphagia (see Table 3). A slight variation in the FILS scale level post-TE was observed between the groups with and without COVID-19, their medians being level 5 and 8, respectively. The Mann-Whitney test was used to determine the difference, showing that the diagnosis of COVID-19 was not a decisive factor for the level in the FILS scale post-TE (U=211.500, z=-0.482, p=0.630). Of the total number of subjects, only 9% were categorized as presenting normal swallowing, while over 90% had some degree of dysphagia. Of the latter percentage, 37.21% presented mild dysphagia, 25.58% moderate dysphagia, and 27.91% severe dysphagia. The percentage of patients with severe dysphagia and normal swallowing was similar in both groups (with and without a diagnosis of COVID-19). A higher percentage of mild dysphagia was observed in the group of patients without COVID-19 and a higher percentage of moderate dysphagia in the group diagnosed with COVID-19 (see Table 4). The Chi-square test was carried out to determine the odds ratio and the degree of severity of dysphagia post-TE for the subjects with and without COVID-19. The results showed that the probability of presenting moderate or severe dysphagia post-TE was 1.59 times greater for patients with COVID-19 than for subjects without the pathology. However, this result was not statistically significant (CI= 0.475 – 5.309, z=0.752, p=0.451). Similarly, the odds of presenting moderate dysphagia post-TE were 1.98 times greater for patients with COVID-19 than for subjects without the pathology. This result was not statistically significant either (CI= 0.484 - 8.133, z= 0.951, p=0.342).

Level obtained in the FILS scale and degree of severity of the dysphagia 10 days post-tracheal extubation

On day 10 post-TE, the level in the FILS scale and degree of severity were determined. Information could not be obtained from 12 subjects in the sample, for the following reasons: discharge (n=8), referral (n=1), re-intubation (n=1), death (n=1), and no access to hospitalization information (n=1). Due to the above, the analysis was performed on the data of 31 subjects, 16 of whom were diagnosed with COVID-19. Regarding the level on the FILS scale, the sample's median was level 8, corresponding to mild dysphagia (see Table 3). There was no variation in the FILS scale between the groups with and without COVID-19, with the median being level 8 for both groups. The Mann-Whitney test was used to determine the difference between groups, showing that the diagnosis of COVID-19 was not decisive for the level of the FILS scale 10 days post-TE (U=85.500, z=-1.437, p=0.151). Of the total sample, 100% presented some degree of severity of dysphagia, with 61.30% having mild dysphagia, 12.90% moderate dysphagia, and 25.80% severe dysphagia. The percentage of subjects with severe dysphagia was the same in both groups, while the percentage with mild dysphagia was the highest. There were no subjects with moderate dysphagia in the group without COVID-19 (see Table 4).

Differences in the FILS scale level between groups immediately post-extubation and 10 days post-extubation

The Wilcoxon test was used to determine the differences between groups regarding the level in the FILS scale immediately post-TE and 10 days post-TE. The analysis was carried out considering exclusively the 31 subjects from whom information was obtained. The test showed that the FILS scale level immediately post-TE significantly increased after 10 days for both groups, meaning that the patients presented an improved swallowing function. The difference was greater in the group without COVID-19 (Z= -2.680, p= 0.004) than in the group with COVID-19 (Z= -2.157, p= 0.016).

Table 4. Characteristics of the degree of severity of the dysphagia after tracheal extubation.

	Total Sample		COVID-19 (+)		COVID-19 (-)	
	Frequency	%	Frequency	%	Frequency	%
Degree of severity of the dysphagia after extubation						
Severe Dysphagia	12	27.91	6	13.95	6	13.95
Moderate Dysphagia	11	25.58	7	16.28	4	9.3
Mild Dysphagia	16	37.21	7	16.28	9	20.93
Normal Swallowing	4	9.3	2	4.65	2	4.65
Degree of severity of the dysphagia 10 days after extubation						
Severe Dysphagia	8	25.8	4	12.9	4	12.9
Moderate Dysphagia	4	12.9	4	12.9	0	0
Mild Dysphagia	19	61.3	8	25.8	11	35.5
Normal Swallowing	0	0	0	0	0	0

DISCUSSION

The objective of this research was to analyze the characteristics of the swallowing function in extubated critical patients with and without a diagnosis of COVID-19. The median for the total days of OTI was 12 days, being on average higher for subjects with COVID-19 (11 days) than for those who did not have this diagnosis (6 days). It should be noted that this figure was similar to the 12-day average reported by Guan et al. (2020) regarding the use of IMV in patients with COVID-19.

Concerning the degree of severity of dysphagia, it was observed that over 90% of the subjects presented dysphagia immediately after extubation. The severity of dysphagia fluctuated mostly between moderate (16.28%) and mild (16.28%) in patients with COVID-19, while severity was mild in most subjects without the disease (20.93%). At 10 days post-extubation all patients, both with COVID-19 and without COVID-19, still presented some degree of dysphagia, in their majority mild. This may be because patients were discharged from the CCU due to the demand for beds, and placed in lower complexity units when they were hemodynamically stable, although they still required intensive care.

In relation to the level of dysphagia according to the FILS scale, no significant differences were observed between the groups (with or without COVID), neither immediately, nor 10 days post-TE. In contrast, differences were found in the score when comparing the evaluations on day one and day 10 post-TE, for both groups. Particularly, it was observed that the degree of dysphagia improved for subjects both with and without COVID-19, as shown by a significant increase in the FILS scale level. This suggests that the swallowing difficulties presented by the subjects with COVID-19 who were part of this study were similar to those of the subjects without the disease.

These results contrast with previous evidence showing the negative consequences of COVID-19 on swallowing (Dziewas et al., 2021; Ezpeleta et al., 2020; Fernández et al., 2020; Ghannouchi et al., 2020; Martin–Martinez et al., 2021; Osbeck Sandblom et al., 2021; Yang et al., 2020), as well as the experience reported by clinicians regarding the difficulties in the rehabilitation process of patients infected with the virus, which suggests a higher degree of severity post-TE in patients with the diagnosis than in those without. Nevertheless, previous studies that have reported swallowing difficulties in subjects with COVID-19 have not included a group of patients with OTI

without this disease (Dziewas et al., 2021; Ezpeleta et al., 2020; Fernández et al., 2020; Ghannouchi et al., 2020; Martin–Martinez et al., 2021; Osbeck Sandblom et al., 2021; Yang et al., 2020). On the other hand, the present study included patients with and without COVID-19 in a specific period, which did not allow adequately comparing the populations. Therefore, the fact that no differences were found between both groups allows us to infer that post-extubation dysphagia could be caused by the OTI itself and by the presence of the ETT, and may not be a consequence of other complications related to the diagnosis. It is noteworthy that subjects with COVID-19 spent significantly more days intubated than those without the virus, which increases the number of beds used and the costs associated with health care. However, this did not result in significant differences between groups when observing the presence of dysphagia immediately post-TE and 10 days after it.

This study presents some limitations. It is important to mention that this research could have considered a larger sample with a more in-depth analysis over a longer period, in order to obtain more solid associations of probability. However, during the period of analysis, SLPs worked a modified 4 x 4 shift, changing to a 2 x 2 modality, thus ensuring the presence of at least one professional each day of the week. For this purpose, teams were created that took turns using a two-days-on-two-days-off rotation, so that there was ongoing care for the entire month. Thus, considering a longer period for the analysis would have created bias, since the months before and after the analysis period the SLPs worked mainly daytime hours, Monday to Friday, with fewer professionals treating patients during weekends. In addition, the expeditious medical discharge due to the high bed demand could be considered a limitation since around 25% of the sample was discharged 10 days after extubation, which is why no subjects with normal swallowing are present in the analysis.

Finally, it is necessary to carry out further research on this topic and to encourage the development of both national and international studies, either at a local level or in multiple centers, using diverse designs. This will allow generating data in this field regarding subjects with COVID-19, not only during their hospitalization but also after discharge.

CONCLUSION

No statistically significant differences were found in the level of the FILS scale and severity of dysphagia when analyzing the sample of extubated critical patients with and without COVID-19. A high percentage of the extubated subjects without the virus presented immediate mild dysphagia, while the majority of extubated patients with COVID-19 presented immediate mild and moderate dysphagia. At 10 days post-extubation there were no differences in the FILS scale between both groups. However, each group showed a statistically significant difference in the FILS scale when comparing the evaluation of swallowing immediately post-TE and 10 days post-TE. A higher level was found for each group, meaning that on day 10 post-TE swallowing was more functional, with a lower degree of severity of the dysphagia. It could be inferred that OTI and the use of ETT are the cause of immediate oropharyngeal dysphagia after TE, considering that over 90% of the sample presented some degree of dysphagia post-extubation. Considering the above, it is necessary to highlight the importance of including SLPs in CCU teams, both for pre- and post-extubation nutritive and non-nutritive intervention of swallowing, due to the high percentage of patients who present dysphagia after OTI, and of patients who are tracheostomized due to failure in the weaning process. It is fundamental to continue to perform research on patients with COVID-19 in order to collect additional information, and to work with larger samples in case-control, cohort, quasi-experimental, and/or randomized experimental studies.

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