Speech therapy and tracheostomy rehabilitation in COVID 19: five preliminary case reports

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Abstract

Studies addressing the hospitalization of patients affected by COVID-19 have reported that length of hospital stay in intensive care unit varies between 12 and 22 days. Part of these patients require orotracheal intubation (OTI) and, in cases where OTI is prolonged and/or with complications, they consequently end up undergoing open surgical tracheostomy (OST). In most hospitals, a multidisciplinary team composed of physicians, nurses, physiotherapists and speech-language therapists is responsible for this process, which allows early removal of the tracheal cannula, making it safer for patients, with reduced risk of failure and complications. Although safety recommendations and procedures support the most diverse protocols of weaning from mechanical ventilation and tracheostomy, there is no universally accepted protocol for this transition. This is a complex issue that is necessary in the current scenario, because studies establishing weaning and decannulation criteria in patients with COVID-19 are urgent at this moment. **Purpose**: To describe the process of weaning from the tracheostomy in COVID-19 patients. **Methods**: This is a descriptive study presenting a series of case reports. It describes the decannulation process in five tracheostomized patients with COVID-19 (3 men and 2 women) aged 41 and 74 years who agreed to participate in the study and remained hospitalized in a private hospital in the city of XXXX. **Results**: The decannulation process of the five COVID-19 patients lasted up to 10 days (mean duration of 6.4 days).

Introduction

Data on COVID-19) in XXX on November 1st, 2020 showed 5.545.705 cases and 160,104 deaths [1]. On the same date, sanitary and health authorities reported that approximately 20% of patients in XXXXX remain hospitalized. This number is compatible with that disclosed by other countries that were at the epicenter of the pandemic in March and April 2020. Unlike the average figures reported by those countries, approximately 6.5% of the patients hospitalized in XXXX as a result of COVID-19 infection remain in intensive care units (ICU) [2]. The city of XXXXXX presents the largest number of cases and deaths, 1.1117.147 and 39.311, respectively, with a bed occupancy rate >70% and mortality of 6.3% [2]. Studies have reported that the length of hospital stay of patients affected by COVID-19 varies between 12 and 22 days [3-5]. Patients who require prolonged mechanical ventilation usually undergo open surgical tracheostomy (OST) to reduce the need for sedation and assist with the process of weaning from mechanical ventilation. A recent study reported that patients with COVID-19 spent an average of 16 days under mechanical ventilation and an average length of ICU stay of 17.5 days [6]. Part of the patients admitted to ICU require prolonged orotracheal intubation (OTI) and/or present complications and, as a result, end up undergoing OST.

In most hospitals, a multidisciplinary team composed of physicians, nurses, physiotherapists and speech-language therapists is responsible for this process, which allows early removal of the tracheal cannula, making it safer for patients, with reduced risk of failure and complications. Multidisciplinary management enables reductions in length of stay/use of the tracheal cannula, length of hospital stay,

and number adverse events [7,8]. Tracheostomy decannulation consists in deflating the cuff, replacing the plastic cannula with a metal cannula, removing the tracheostomy cannula, and placing the stomal occlusive dressing. Management of tracheal decannulation is variable, but studies consider it viable if the patient presents effective cough, is more alert, and tolerates a speaking valve (SV) up to at least 48 consecutive hours [9-12]. Decannulation is an important step for tracheostomized patients who are no longer dependent on mechanical ventilation [13].

There are many aspects related to the management of patients with COVID-19, a rapidly evolving disease that requires different care strategies and the use of appropriate equipment in a global pandemic scenario. A recent guide published[14] reinforces the recommendations for the urgent need to care for newly tracheostomized patients treated for COVID-19 pneumonia, with an emphasis on tracheostomy care and the weaning and decannulation process. Recommendations include:

- Basic care of tracheostomy and management of emergency situations;
- Cuff management: secretion management, cuff deflation training, and SV adaptation;
- Management of the decannulation process: replacement and occlusion of the tracheostomy tube;
- Proper use of COVID-19 pneumonia (PPE).

Although safety recommendations and procedures support the most diverse protocols of weaning from mechanical ventilation and tracheostomy [14], there is no consensus on the indicators for decannulation in the literature, which shows criteria for indication and success based on clinical experience, routine of some health services, experience reports of professionals and interdisciplinary teams, and on protocols prepared through routines, observation of clinical experience exchanged by teams and with support from knowledge of hospital infection control sectors [11,15]. For patients affected by COVID-19, it is suggested that cuff deflation be commenced only if the patient is able to maintain gas exchange and is self-ventilating for 24 h with moderate to low levels of supplemental oxygen. Usual considerations should be made, including assessment of alertness, secretion control, effective cough, and capacity for physical function [14].

Regarding speech-language therapy rehabilitation in COVID-19 patients, on April 22, 2020, the American Speech-Language-Hearing Association (ASHA) updated its guidelines regarding aerosol generation procedures. According to ASHA, speech-language therapists who perform procedures that can result in generation of aerosols during the management of COVID-19 patients, in particular, the procedures that are likely to induce coughing, e.g., sputum induction (open airway aspiration), should performed them with caution and avoid them when possible [13] ASHA also recommended that speech-language pathologists be provided with adequate protection against droplet transmission during aerosol generation procedures.

- Healthcare personnel (HCP) in the room should wear an N95 or higher-level respirator, eye protection, gloves, and a gown;

- The number of HCP present during the procedure should be limited only to those essential for patient care and procedure support. Visitors should not be present for the procedure;
- Clean and disinfect procedure room surfaces promptly as described in the section on environmental infection control below;
- Use of PPE recommended by the Centers for Disease Control (CDC) for all aerosol generation procedures, regardless of the symptom presentation of the patient - specifically because of the transmission risk of the novel coronavirus from asymptomatic or pre-symptomatic carriers.

Identification of clinical and speech indicators associated with successful decannulation of tracheostomized patients is important for a safe procedure with reduced risk of complications. Reestablishment of the upper airway mechanism allows the functions of breathing, communication and swallowing to be activated through normal physiology.

An Australian study described that the average time of early decannulation in ICU patients is 25 days [16]. A recent study on sociodemographic, clinical and speech-language indicators predictive of success for decannulation [17] revealed that the time of occlusion of the tracheostomy tube was associated with the success of decannulation and showed that the mean occlusion time in patients was 60.5 hours. Tracheal tube occlusion has been described in the literature as predictive of success in decannulation. Studies have described that the occlusion test is the only way to fully evaluate the upper airways (UA) and vocal fold integrity and should be performed gradually until the time of decannulation. For success, It is fundamentally important to monitor the respiratory parameters during occlusion, the level of oxygen saturation, the ability to maintain adequate breathing in ambient air (or the need for oxygen supplementation) [9,18,19.]

A systematic literature review [20] reported that the decannulation process is most successful when the team uses a small-caliber cannula in the airways during weaning. The review study also suggested that this process can contribute to increased airway resistance and, consequently, enhanced respiratory work in patients with marginal ventilation capacity.

As for the tracheostomy weaning process in COVID-19 patients, most authors agree that the optimization of weaning from mechanical ventilation is important, as its prolongation is associated with increased patient mortality. The COVID-19 pandemic has revealed the high level of spread of the SARS-CoV 2 virus, which currently demands greater ICU bed availability and requires fast, efficient and safe actions in XXXXXX. Thus, studies presenting weaning and decannulation criteria in COVID-19 patients are mandatory.

The present study aims to describe the process of weaning from the tracheostomy in the first patients admitted with COVID-19 in a private hospital in the state of XXXXXX, XXXXXX.

Methods

This research was submitted to the Research Ethics Committee (*Comitê de Ética em Pesquisa* - CEP) of "XXXXXX" in XXXXXX and approved under protocol CAAE: 34000020.3.0000.5455. This is a retrospective descriptive study presenting a series of case reports.

Participants

Five patients (3 men and 2 women), aged between 41 and 74 years, who remained hospitalized at "XXXXXX" in XXXXXX, XXXXXX as a result of COVID-19 infection were included in this study. Inclusion criteria comprised tracheostomized patients admitted to ICUs for the treatment of Severe Acute Respiratory Syndrome (SARS) caused by COVID-19. All patients were admitted to the service in March 2020. Data on the first five tracheostomized COVID-19 patients who were seen by the Speech-language Therapy Service and who agreed to participate in the study were collected by the service coordinator and the main researcher from their medical records and input into a spreadsheet. The medical records were analyzed for age, sex, number of days under mechanical ventilation, the time elapsed (in days) from beginning of care to decannulation, as of June 2020. Details on pre-existing comorbidities were also considered.

Procedures

The management of patients with COVID-19 in this hospital is done by a multidisciplinary team. In patients with tracheostomy the medical team was responsible for requesting the speech-language assessment. Only when patient was capable to stay out of the mechanic ventilation continuously, the SLP assessment was requested. The initial speech-language assessment was conducted during the post-acute phase of patient recovery and indicated whether patients presented clinical conditions for weaning from tracheostomy and oral feed initiation.

Speech-language assessments were conducted in the ICU environment and the tracheal tubes were manipulated using a tracheostomy closed suction system (Trach Care) - a system adapted to the orotracheal tube or to the tracheostomy cannula that consists of a tracheal aspiration probe inserted into a sterile plastic sleeve connected directly to the patients, so that they can be suctioned with no need for interrupting mechanical ventilation and openness to the environment. The closed suction system provides reduced risk of hypoxemia, arrhythmia and contamination, and should be preferred especially when high positive end-expiratory pressure (PEEP) values are used, such as in acute lung injury. The closed endotracheal suction system is indicated in patients with PEEP values >10 and/or fraction of inspired oxygen (FiO_2) ≥60% that should be protected from aerosols [21]. Before performing this procedure, the patients should be pre-oxygenated with FiO_2 100% for at least 30 s in order to avoid hypoxemia during the technique. The tracheostomy management process was guided by practices that minimize the risks associated with tracheostomy with regard to aerosol generation procedures [13,14,22]. All the PPE necessary for the procedure were used, according to the protocol described for the aerosol generating procedure [14,22]. The SV is a useful tool in weaning from tracheostomy, since the upper airway space is partially restored (on expiration), because it trains the patient to regain control of the upper respiratory

tract and provides protection to the airways. In addition, the SV facilitates phonation and, therefore, verbal communication [11]. In the case of COVID-19 patients who are forbidden to receive visits from friends and family, the SV improves the mood, perspectives and sense of recovery of these patients and allows communication by phone/video link, which is associated with its use. A SV was adapted in all patients by a SLP according to the following standard: 15-min test with deflated cuff in the assessment, 3h of SV adaptation on the first day of care, continuous use of SV from the second day of care. In the third day a multidisciplinary team discuss according to the clinical conditions if it possible to replace the cannula (plastic for a metallic) and a thoracic surgeon was responsible for this procedure. The metallic cannula is a part of the XXXXXX hospital's decannulation protocol. According to the protocol when the patient remains stable with the metal cannula for more than 48 hours, decannulation is indicated. For the COVVID-19 patients the time was reduced. If the patient remained stable with the metal cannula for more than 24 hours, decannulation was indicated.

Clinical assessment of swallowing was initiated based on the first dysphagia screening. The screening swallowing was prompted to observe for (1) coughing during or between swallows or up to one minute after swallowing, (2) wet or 'gurgly' voice quality post swallows and (3) increased respiratory rate post spittle swallow. Non-instrumental evaluations (e.g., bedside/clinical swallow evaluation) are used to identify COVID-19 patients at risk for swallowing impairment. During the oral intake tests, patients received food/liquid consistencies that were considered safe for their medical condition. Liquids were delivered using a straw, spoon or glass, depending on the participants' ability to feed themselves, whereas food was offered using a spoon. The food consistencies were pasty, soft solid and dry solid, whereas the liquid consistencies were thin (regular), slightly thick (equivalent to "nectar") and moderately thick (equivalent to "honey"). The suitability for progression to the next food/liquid consistency was based on safety and efficiency of intake. The consistencies were considered safe when the participants did not demonstrate clinical signs of laryngeal penetration or tracheal aspiration or discomfort and were able to manage them efficiently. The tests/training were interrupted if the patient showed clinical signs of penetration or aspiration, or if the speech-language therapist noticed severe swallowing dysfunction with a high risk of aspiration (that is, not safe for oral ingestion) in the non-instrumental assessment. The functional classification of dysphagia severity was completed using the functional oral intake scale (FOIS) [23] according to the following classification: Level 1: Nothing by mouth, Level 2: Tube-dependent with minimal attempts of food or liquids; Level 3: Tube-dependent with consistent oral intake of food or liquids; Level 4: Total oral route of a single consistency. Level 5: Total oral route with multiple consistencies but requiring special preparations or compensations; Level 6: Total oral route with multiple consistencies without special preparation but with specific food limitations; Level 7: Total oral diet with no restrictions.

After the assessment, daily consultations continued to be carried out. The goal was to release and evolve oral feeding and led the tracheostomy decannulation safely and in the shortest possible time. A fact that must be considered is that none of the patients presented moderate or severe dysphagia. After

swallowing assessment, speech therapy followed to assist in weaning from enteral feeding, to manage and evolve the consistencies offered and to wean the tracheostomy.

Case reports

Case 1 (63 days of hospitalization)

A retired widow aged 72 years that had been working as a restaurant cashier until September 2019 when she was diagnosed with lung adenocarcinoma. She underwent chemotherapy until December 2019. In March 2020 she presented with myalgia, chills, sudden fever, and cough with minimal sputum. On the tenth day of hospitalization, the participant was intubated and orally ventilated and non-oral feeding by nasogastric tube was started. She was intubated and ventilated for five days and OST was performed on the 15th day of hospitalization. She was discharged from ICU after 50 days. The participant had a prolonged and complicated hospital stay and remained under acute treatment for 63 days (see Table 1). The speech-language therapy team was actively involved during the subsequent 18 days following weaning from tracheostomy and in treatment of dysphagia. Speech-language therapy started on the 32nd day of hospitalization. A medium amount of clear secretion was observed in the closed suction system of mechanical ventilation. Trach Care with cuff was adapted (2 l of O_2) with cuff manipulation in 1 ml increments, keeping the patient with deflated cuff for 15 min. During the procedure, the patient remained stable without changes in respiratory parameters and with systematic swallowing of saliva. The patient remained with hemodynamic instability and returned to speech-language therapy on day 38 of hospitalization. Again, a medium amount of clear secretion was observed in the closed suction system of mechanical ventilation. The same aspiration procedure was performed, keeping the patient with deflated cuff for 15 min. During the procedure, the patient remained stable without changes in respiratory parameters and with systematic swallowing of saliva. On day 39, the patient used a SV for 3 h, presented SpO_2: 91% and no respiratory complaints. During assessment, breathy hoarse vocal quality, adequate loudness and pitch, and functional swallowing of saliva without signs of penetration/aspiration were observed at cervical auscultation. After consistency test, the patient was prescribed a light diet with pasty food and slightly thick liquids (STL), level 4 on the FOIS scale. On day 48, the plastic cannula was replaced with a metal cannula, and the patient presented without complications and SpO_2: 95%, had no respiratory complaints and maintained good acceptance of oral diet without complications. On day 49, functional swallowing training was performed with soft solids, and the patient presented with complete swallowing and no clinical signs suggestive of bronchoaspiration. After consistency test, the patient was prescribed a mild diet with soft solid food and thin liquids (TL), level 5 on the FOIS scale. The patient was decannulated and started with speech-language therapy 50 days after admission. She presented SpO_2: 98%, no respiratory complaints and was prescribed a general diet with dry solids and thin liquids, level 7 on the FOIS scale.

Case 2 (39 days of hospitalization)

A 58-year-old male patient with Diabetes Mellitus (DM), with a diagnosis of COVID-19 confirmed by another health service, under home monitoring. He had returned from a trip to Germany 15 days before presenting cough, fever and myalgia. His wife reported complaints of dyspnea and interrupted speech. Upon hospital admission, the patient presented SpO_2: 80%, chest X-ray with infiltrates, bilaterally, and a history of DM. On the same day of admission, he was intubated and ventilated, and non-oral feeding via a nasoenteral tube (NET) was started. During a 34-day stay in ICU, the participant was ventilated for 9 days, and OST was performed on the 23rd day of hospitalization. The speech-language therapy team was actively involved in the subsequent six days after weaning from tracheostomy. Speech-language therapy started on the 28th day of hospitalization with a cuff manipulation test and swallowing assessment. A medium amount of thick secretion was observed in the closed suction system of mechanical ventilation. Trach Care with cuff was adapted with cuff manipulation in 1 ml increments, keeping the patient with deflated cuff for 15 min. The patient remained stable (SpO_2: 92% with 2l of O_2). The patient presented clear and audible voice with breathy hoarse vocal quality, adequate pitch and reduced loudness, and spontaneous swallowing of saliva. On day 29, the plastic cannula was maintained with inflated cuff and offer of 1L of O_2. An average amount of clear semi-thick secretion was observed in the closed suction system of mechanical ventilation. When deflating the cuff, cough and a large amount of thick sputum were observed (SpO_2: 97% with 2l of O_2). A SV with O_2 was adapted, and a weak and breathy voice was observed. After consistency test, the patient was prescribed a pasty fractioned diet, level 3 on the FOIS scale. The patient used an SV for 3 h without discomfort. The multi-professional team agreed to maintain the patient with continuous use of the SV. On day 32, from the plastic cannula was replaced with a metal cannula without complications, and the patient presented SpO_2: 95%, no respiratory complaints, and good acceptance of the fractioned oral diet without complications. After consistency test, the patient was prescribed a pasty food + STL diet, level 4 on the FOIS scale. The patient was decannulated on day 34 and discharged from speech-language therapy, maintaining SpO_2: 99%, no respiratory complaints, and a general diet with dry solids + TL, level 7 on the FOIS scale.

Case 3 (60 days of hospitalization)

A 74-year-old female patient with osteomyelitis and Systemic Arterial Hypertension (SAH) transferred from another health service. On admission, she was feverish, desaturating and with diagnostic hypothesis of aspiration pneumonia and urinary tract infection (UTI). She presented with severe hearing loss and confirmed SARS-CoV-2 infection. She was intubated and ventilated, and non-oral feeding via NET was started on day 6 of hospitalization, evolving with the need for vasoactive drugs (VAD - noradrenaline and dobutamine) on day 7. During a 45-day stay in ICU, the participant was mechanically ventilated for 15 days, OST was performed on the 15th day of hospitalization. The speech-language therapy team was actively involved in the subsequent nine days following weaning from tracheostomy. Speech-language therapy started on day 39 of hospitalization with a cuff manipulation test and swallowing assessment (Table 1). A medium amount of thick secretion was observed in the closed suction system of mechanical ventilation. Trach Care with cuff was adapted with cuff manipulation, keeping the patient with deflated cuff and SV throughout the service. The patient remained stable (SpO_2:

98% with 1L of O_2). The patient presented a clear and audible voice with breathy hoarse vocal quality, adequate pitch and reduced loudness, and no spontaneous swallowing of saliva. She remained with the cuff deflated comfortably 15 min. On day 41 of hospitalization, an average amount of thick secretion was observed in the closed suction system of mechanical ventilation. Again, after adapting the SV, a clear and audible voice with breathy hoarse vocal quality, adequate pitch and reduced loudness was observed and no spontaneous swallowing of saliva was observed. The patient remained for 3 h with the SV without discomfort (SpO_2: 98% with 1L of O_2). The multi-professional team agreed to maintain the patient with continuous use of the SV. On day 44 of hospitalization, after consistency test, the patient was prescribed pasty food + STL diet, level 4 on the FOIS scale and continued to use the SV. On day 46, the plastic cannula was replaced with metal cannula without complications, and the patient presented SpO_2: 95%, no respiratory complaints, and good acceptance of the fractioned oral diet without complications. After consistency test, she was prescribed a light soft solid food + STL diet, level 5 on the FOIS scale. The patient was decannulated on day 34 of hospitalization and discharged from speech-language therapy, maintaining SpO_2: 99%, no respiratory complaints, and a mild soft solid food + TL diet, level 6 on the FOIS scale.

Case 4 (46 days of hospitalization)

A male patient aged 69 years with SAH, dyslipidemia (DLP), fever, and cough on admission. The patient had a history of SAH and DLP. Computed tomography (CT) of the chest showed peripheral distribution of bilateral ground-glass opacities. SARS-CoV-2 positive at PCR. He was transferred from an emergency unit using a 0_2-nasal catheter with need for increased support and was transferred to the ICU on day 3 of hospitalization. On day 4, he was intubated and ventilated, and non-oral feeding via NET started. During a 22-day stay in ICU, the participant was intubated and mechanically ventilated for 11 days, and OST was performed on the 15th day of hospitalization. The speech-language therapy team was actively involved in the subsequent five days after weaning from tracheostomy. Speech-language therapy started on the 36th day of hospitalization with a cuff manipulation test and swallowing assessment (Table 1). A medium amount of thick secretion was observed in the closed suction system of mechanical ventilation. Trach Care with cuff was adapted with cuff manipulation. The patient was kept with deflated cuff and an adapted SV throughout the service. He patient remained with the SV for 3 h without discomfort (SpO_2: 97% with 1l of O_2). A clear and audible voice with breathy hoarse vocal quality, adequate pitch and reduced loudness, and spontaneous and systematic swallowing of saliva were observed. The multi-professional team agreed to maintain the patient with continuous use of the SV. On day 38, after consistency test, he was prescribed a pasty food + STL diet, level 4 on the FOIS scale. On day 39, the plastic cannula was replaced with a metal cannula, and the patient presented SpO_2: 95%, and no respiratory complaints or other complications. He also maintained good acceptance of the oral diet and was prescribed a light soft solid + TL diet, level 5 on the FOIS scale. The patient was decannulated on the 41st day of hospitalization and was discharged from speech-language therapy, maintaining SpO_2: 99%, no respiratory complaints, and a mild dry solid + TL diet, level 6 on the FOIS scale.

Caso 5 *(40 days of hospitalization)*

A male patient aged 41 years with no previous comorbidities. Upon admission, he presented with cough, fever, and dyspnea. Immediately after admission he had to be transferred to ICU due to worsening dyspnea and desaturation even with the use of an O_2-catheter at 4L/min. On day 2 of hospitalization, he developed acute respiratory failure (ARF). OTI is required. The patient was intubated and ventilated, and non-oral feeding via NET was started. During a 30-day stay in ICU, the participant was intubated and mechanically ventilated for 15 days, and OST was performed on the 16th day of hospitalization. The speech-language team was actively involved in the subsequent five days following weaning from tracheostomy. Speech-language therapy was started on the 26th day of hospitalization with a cuff manipulation test and swallowing assessment (Table 1). A medium amount of thick secretion was observed in the closed suction system of mechanical ventilation. Trach Care with cuff was adapted with cuff manipulation. The patient was kept with deflated cuff and an adapted SV throughout the service. He remained stable for 3 h with use of SV (SpO_2: 95% with 2L of O_2). A clear and audible voice with breathy hoarse vocal quality, adequate pitch and reduced loudness, and spontaneous and systematic swallowing of saliva were observed. The multi-professional team agreed to maintain the patient with continuous use of the SV. After consistency test, he was prescribed a pasty fractioned diet, level 3 on the FOIS scale. On day 29, the plastic cannula was replaced with a metal cannula without complications, and the patient maintained SpO_2: 95%, no respiratory complaints, and good acceptance of the oral diet. After a new consistency test, he was prescribed a light soft solid food+ TL diet, level 5 on the FOIS 5 scale. On day 31, the patient was decannulated and discharged from speech-language therapy, maintaining SpO_2: 99%, no respiratory complaints, and a general dry solid+ TL diet, level 7 on the FOIS scale.

Discussion

Most patients with COVID-19 admitted to ICU require mechanical ventilation, and tracheostomy is frequently performed by intensive care physicians to facilitate ventilatory weaning when mechanical ventilation is prolonged. Thus, it is expected that a significant number of patients admitted with COVID-19 will require tracheostomies [24,25]. This study, which aimed to describe the procedure for weaning from mechanical ventilation and tracheostomy in the first patients affected by COVID-19, points out that it is possible to safely optimize this process. The process of weaning from a tracheostomy and reintroducing a safe feeding route was conducted by the speech-language therapy team of the hospital. There is still no data on post-extubation dysphagia in patients with COVID-19 to date [26], but the cases reported here show that swallowing rehabilitation can occur concurrently with the evolution of tracheostomy and in a dynamic and safe way. A recent study [17] on the tracheostomy weaning process in different patients shows an association between success of decannulation and functionality of swallowing. In the five cases described here, patients progressed to decannulation and exclusive oral feeding without restrictions, regardless of associated comorbidity and/or complications during hospitalization. This fact has led us to believe that, although the acute condition can be severe and prolonged, the short-term responses to respiratory and swallowing rehabilitation are rapid and positive. After stabilization of the

respiratory condition, the maximum time elapsed between beginning of stimulations and weaning from tracheostomy was 10 days (mean duration of 6.4 days).

The first cases of weaning from tracheostomy in COVID-19 patients proved to be safe, fast and promising with regard to the optimization and safety of this procedure during the pandemic. Our service continues to collect data to analyze whether the successful weaning from tracheostomy of these initial patients will be continued.

Conclusion

This study contributes to the still limited literature addressing the rehabilitation process of patients affected by COVID-19. There is still a need for large-scale prospective studies to determine whether early weaning from tracheostomy in COVID-19 patients can be maintained safely. Due to the limited information on this population currently available, the assessment, management and rehabilitation of dysphagia remain a challenge for speech-language pathologists.

Declarations

1. **Fundings**: The research was supported by the authors
2. **Conflicts of interest/Competing interests:** the authors have a conflict of interest
3. **Ethics approval:** the research was approval by Hospital 9 de Julho ethical commitê (CAAE 34000020.3.0000.5455)
4. **Consent to participate and consent for publication:** All participants receive and sign the consent forms
5. **Availability of data and material:** not applicable
6. **Code availability:** not applicable
7. **Authors' contributions:**

TDS was responsible for design de study, data collection, writhe and review the manuscript

FMLG was responsible for assist the patients during the study

DCG was responsible for assist the patients during the study and collecting data

AT was responsible for collecting data

LT was responsible for review the manuscript

References

1. Ministério da Saude, Governo Federal do Brasil. Painel Coronavirus. Brasilia – BR. Online. Acessado em 10/06/2020. Disponível em https://covid.saude.gov.br

2. Governo do Estado de XXXXXX. Boletim online sobre Coronavirus. XXXXXX – Brasil. Online. Acessado em 10/06/2020. Disponível em https://www.seade.gov.br/ coronavirus
3. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. 2020;395(10229):1054-1062. doi:1016/S0140-6736(20)30566-3
4. Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med*2020; **382**: 1199- 1207.
5. Grasselli G, Zangrillo A, Zanella A, et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the lombardy region, Italy. *JAMA*2020; **323**: 1574-1581
6. Ziehr DR, Alladina J, Petri CR, et al. Respiratory pathophysiology of mechanically ventilated patients with COVID-19: a cohort study. Am J Respir Crit Care Med. 2020 April 29 [Epub ahead of print].
7. Bonvento B, Wallace S, Lynch J, Coe B, McGrath BA. Role of the multidisciplinary team in the care of the tracheostomy patient. J Multidiscip Healthc. 2017; 10: 391-398.
8. Mah JW, Staff II, Fisher SR, Butler KL. Improving Decannulation and Swallowing Function: A Comprehensive, Multidisciplinary Approach to Post-Tracheostomy Care. Respir Care. 2017; 62(2): 137-143.
9. Garuti G, Reverberi C, Briganti A, Massobrio M, Lombardi F, Lusuardi M. Swallowing disorders in tracheostomised patients: a multidisciplinary /multiprofessional approach in decannulation protocols. Multidiscip Respir Med. 2014;9:36. http://dx.doi.org/10.1186/2049-6958-9-36 .
10. Freeman-Sanderson AL et al (2018) Quality of life improves for tracheostomy patients with return of voice: a mixed methods evaluation of the patient experience across the care continuum. Intensive Crit Care Nurs 46:10–16. https://doi.org/10.1016/j.iccn.2018.02.004
11. Mendes F, Ranea P, Oliveira CT. Protocolo de desmame e decanulação de traqueostomia. UNILUS Ensino e Pesqui. 2013;10(2):1-12.
12. *Cohen O, Tzelnick S, Lahav Y, Stavi D, Shoffel-Havakuk H, Hain M, Halperin D, Adi N.* Feasibility of a single-stage tracheostomy decannulation protocol with endoscopy in adult patients. *2016 Sep; 126(9):2057-62.*
13. *ASHA - American Speech-Language-Hearing Association. ASHA Guidance to SLPs Regarding Aerosol Generating Procedures, April 22, 2020. Acessado em 17/04/2020. Dispon~ivel em* https://www.asha.org/SLP/healthcare/ASHA-Guidance-to-SLPs-Regarding-Aerosol-Generating-Procedures/
14. Rovira, A., Dawson, D., Walker, A. et al. Tracheostomy care and decannulation during the COVID-19 pandemic. A multidisciplinary clinical practice guideline. Eur Arch Otorhinolaryngol (2020). https://doi.org/10.1007/s00405-020-06126-0
15. Singh, R. K., Saran, S., & Baronia, A. K. (2017). The practice of tracheostomy decannulation-a systematic review. *Journal of intensive care*, *5*, 38. https://doi.org/10.1186/s40560-017-0234-z

16. Leung R, MacGregor L, Campbell D, Berkowitz RG: Decannulation and survival following tracheostomy in an intensive care unit. Ann Otol Rhinol Laryngol 2003, 112: 853-858
17. Côrte, Margaret Mendonça Diniz da, Vicente, Laélia Cristina Caseiro, & Friche, Amélia Augusta de Lima. (2019). Decanulação: indicadores sociodemográficos, clínicos e fonoaudiológicos preditivos de sucesso. *Audiology - Communication Research*, *24*, e2103. Epub April 11, 2019.https://dx.doi.org/10.1590/2317-6431-2018-2103
18. Chan LYY, Jones AYM, Chung RCK, Hung KN. Peak flow rate during induced cough: a predictor of successful decannulation of a tracheotomy tube in neurosurgical patients. Am J Crit Care. 2010;19(3):278-84. http://dx.doi.org/10.4037/ajcc2009575. PMid:19435950
19. Santos R, Hirata G, Zanata I. Tracheal decannulation protocol in patients affected by traumatic brain injury. Int Arch Otorhinolaryngol. 2014;18(2):108-14. http://dx.doi.org/10.1055/s-0033-1363467. PMid:25992074.
20. Kutsukutsa, John MD1; Kuupiel, Desmond PhD2; Monori-Kiss, Anna PhD3; del Rey-Puech, Paula MPH4; Mashamba-Thompson, Tivani P. PhD2 Tracheostomy decannulation methods and procedures for assessing readiness for decannulation in adults: a systematic scoping review, International Journal of Evidence-Based Healthcare: June 2019 - Volume 17 - Issue 2 - p 74-91 doi: 10.1097/XEB.0000000000000166
21. American Association for Respiratory Care. AARC Clinical Practice Guidelines: endotracheal suctioning of mechanically ventilated patients with artificial airways 2010. Respir Care. 2010 Jun;55(6):758–64. 14.
22. TRAN, K. et al. Aerosol Generating Procedures and Risk of Transmission of Acute Respiratory Infections to Healthcare Workers: a systematic review. Plos One. April 2012, vol 7, issue 4.
23. Crary, M. A., Mann, G. D. C., & Groher, M. E. (2005). Initial Psychometric Assessment of a Functional Oral Intake Scale for Dysphagia in Stroke Patients. Archives of Physical Medicine and Rehabilitation, 86(8), 1516–20
24. Takhar A et al (2020) Recommendation of a practical guideline for safe tracheostomy. Eur Arch Otorhinolaryngol. https://doi.org/10.1007/s00405-020-05993-x
25. Angel L et al (2020) Novel percutaneous tracheostomy for critically ill patients with COVID-19. Ann Thorac Surg. https://doi.org/10.1016/j.athoracsur.2020.04.010
26. Frajkova Z, Tedla M, Tedlova E, et al. (2020) Postintubation dysphagia during COVID-19 outbreak-contemporary review. Dysphagia. 2020. https://doi.org/10.1007/s00455-020-10139-6.

Tables

Table 1: Biographical details of the participants

Variable	*Participant 1*	*Participant 2*	*Participant 3*	*Participant 4*	*Participant 5*
Age	72	58	74	69	41
Sex	F	M	F	M	M
Comorbidities	Lung neoplasia	DM	SAH, hypoacusis and osteomyelitis	SAH and DLP	*
Time of acute hospital stay (in days)	63	39	60	46	40
ICU stay (in days)	50	34	45	40	30
Day of hospitalization at the time of OTI	9	1	1	4	1
Day of hospitalization at the time of tracheostomy	15	23	15	19	16
Day of hospitalization for referral to speech-language therapy assessment	32	28	39	36	25
Tracheostomy time until speech-language therapy assessment	5	9	14	22	10
Day of hospitalization at change to metal cannula	44	34	43	40	30
Day of hospitalization at decannulation	49	38	50	43	32
Day of hospitalization at the beginning of oral feeding (FOIS 3 to FOIS 6)	39	30	43	44	27
Day of hospitalization at the beginning of exclusive oral feeding (FOIS 7)	50	34	51	48	30
Number of speech-language therapy sessions between beginning of use of SV and decannulation	**10**	**5**	**7**	**5**	**5**
Total number of speech-language therapy sessions during hospitalization	18	6	9	5	5

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