

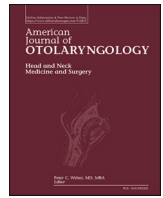


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Protocol for percutaneous tracheostomy and prevention of COVID-19 transmission

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ABSTRACT

Introduction: Currently we are faced with countless patients with prolonged invasive mechanical ventilation as a result of the COVID-19 pandemic, with the consequent increase in the need for tracheostomies and the risks that this includes for both patients and staff. Objective: It is necessary to establish a safety protocol for the performance of percutaneous tracheostomies in order to reduce the associated infections.

Material and methods: 77 patients underwent tracheostomies between March 2020 and March 2021, evaluating the safety of the protocol and the rate of contagion among the staff.

Results: Percutaneous tracheostomy was performed according to the protocol in 72 patients, 5 were excluded due to unfavorable anatomy or other reasons.

There were no cases of SARS COVID-19 contagion among health personnel attributable to the procedure during the three-week follow-up period. There were no surgical complications in this series.

Conclusion: The authors recommend implementing security protocols such as the one discussed in this work, given its low contagion rate and ease of implementation.

1. Introduction

Percutaneous tracheostomy has become routine procedure in intensive care wards, as it is a fairly quick and low-cost procedure [1]. In addition, it is safe in selected patients and has a low risk of complications with good patient selection [1,2]. During the SARS COVID-19 pandemic hospitals have collapsed with patients who have been on mechanical ventilation for a long time, some for over 45 days. There is a great need to perform tracheostomies in this scenario. The generation of aerosols while intervening the airways of COVID-19 patients poses a high risk of contagion for health personnel. International standards advocate the percutaneous tracheostomy over the conventional open one to reduce the risk of infection with COVID-19 [3–5]. We present our experience.

2. Materials and methods

We compiled the tracheostomies performed on COVID-19 patients with mechanical ventilation at the Air Force Hospital during the peak of the epidemic, from March 2020 to March 2021. All of them were tracheostomized at least after day 12 of mechanical ventilation without the

possibility of weaning within the next 48 h. The percutaneous tracheostomy protocol was applied as described before [1]. The coagulation study and coordination with the attending medical team were fundamental, as many of these serious patients were on anticoagulants. There were no exclusion criteria for entering the study. Cook's Blue Rhino percutaneous tracheostomy set was used.

Special measures were taken to avoid aerosols while intervening in the airway, according to [Table 1](#).

3. Results

Seventy-seven percutaneous tracheostomies were performed between March 2020 and March 2021. Using the Avalos' chart protocol [1], only 5 patients were excluded for anatomy and one of them also had severe coagulation problems. The protocol was used to its indicated maximum to avoid an open tracheostomy with the risk of aerosol. The COVID-19 protection measures described in [Table 1](#) were applied, stressing the protection of health staff [6–9]. There were no cases of SARS COVID-19 contagion among health personnel attributable to the procedure during the three-week follow-up period. There were no

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Table 1
Percutaneous TQT protection protocol in COVID-19 patients.

1. Pre-oxygenate the patient, FiO₂ to 100%, PEEP no greater than 8 mmHg.
2. Protection of the health team with N95 face mask, face shield, disposable apron, and gloves.
3. Cleaning of oral cavity using a Yankauer cannula, removing all oropharyngeal secretions.
4. Gauze is placed in the mouth, sealing it to prevent aerosols.
5. The ventilator is turned off, air flow 0, once the trachea has been punctured and the cuff deflated, thus minimizing aerosols.
6. Installation of dilatational tracheostomy.
7. Connect ventilator to tracheostomy cannula immediately.
8. Restart ventilator and confirm pressure/volume curve, auscultation of lung fields to confirm adequate ventilation.

surgical complications in this series.

The 2 patients who were rejected received bedside tracheostomies using the conventional open technique.

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- 77 tracheostomies (72 with the protocol, 5 bedside)
 4 rejection: short neck (anatomy) and anticoagulated
 1 rejection: short neck with ankylosis of the cervical spine
 0 evidence of health personnel contagion
 0 surgical complications using protocol
 19 days of mechanical ventilation was the average for percutaneous tracheostomy
-

4. Discussion

There has been a veritable avalanche of serious patients in need of tracheostomies for airway management. A special feature of this pandemic is airborne contagion due to aerosols, which places health personnel at high risk of infection. A characteristic of the COVID-19 infections is the long periods of mechanical ventilation as compare with another pneumonia cases [6]. Another difficult in this patient is the demonstrated need of prone ventilation. It is feasible to ventilate a patient in prone position, but it dangerous in the case of obstruction of the canula. This is the reason why we perform tracheostomy in more stable patients, so that the reason why the average of tracheostomy is in 19 days of mechanical ventilation.

Use of the percutaneous tracheostomy technique facilitates protection of staff, as it significantly reduces aerosol levels compared to the open tracheostomy. The difficulty that may emerge is that to ensure it is a safe procedure for patients, they must meet certain conditions, as shown in the previous study [1].

Furthermore, in this study we added a protocol to reduce the production of aerosols coming mainly from the pharynx and oral cavity because air begins to pass from the mechanical ventilator to the pharynx when the endotracheal tube cuff is deflated or damage at the start of the procedure.

This protocol emphasizes cleaning of the oral cavity and pharynx, which are then sealed with gauze, and the ventilator is turned off when the trachea has been located and the guide inserted, taking advantage of

the patient's functional reserve for 1 min while the cannula itself is installed [11–13]. We always install tracheal cannula number 8 to facilitate cleaning of the airway.

No staff were infected and there were no surgical complications with proper case selection and protection measures to avoid producing aerosols [14].

5. Conclusion

The COVID-19 pandemic presents us with a series of challenges and difficulties, given its high rate of contagion, it is necessary to establish clear protocols when carrying out procedures that expose health personnel to infection.

Infected patients require long stays in critical care units and prolonged mechanical ventilations that will require interventions such as tracheostomies, which is why it is urgent to provide prevention strategies for personnel in these types of procedures.

In our series of cases there were no incidents or infection rates among health personnel, being a safe and replicable protocol for the medical community.

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