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Elective tracheostomy in mechanically ventilated patients affected by COVID-19: preliminary case-series from Lombardy, Italy.

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ABSTRACT

The COVID-19 outbreak poses continue struggles due to the unprecedented number of patients admitted to Intensive Care Units and overwhelming need for mechanical ventilation. We report a preliminary case-series of 32 COVID-19 patients who underwent elective tracheostomies, after a mean intubation period of 15 days (range, 9-21 days). The procedure was performed with both percutaneous (10 cases) and open surgical techniques (22 cases). Neither procedure-related complications nor viral transmission to healthcare workers were observed. Our preliminary experience support the safety of tracheostomy, provided that appropriate protocols are strictly followed. The post-operative care is still debated, and, prudentially, our protocol includes tracheal tube change not before two weeks after tracheostomy; cuff deflation and decannulation deferral until after negativization of SARS-CoV-2 tests. This is the first case-series reported on such a rapidly evolving issue and might represent a source of information for clinicians worldwide who will soon be facing the same challenges.

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INTRODUCTION

The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2), has rapidly spread worldwide with critical outbreaks in northern Italy. Airways management represents one of the most critical aspects of supportive therapy and prolonged mechanical ventilation is often required.[1] Elective tracheostomies in this setting can be risky both for patients, due to severe hypoxemia, and for the healthcare team, due to high potentials for viral transmission during this aerosol generating procedure. Several COVID-19-related recommendations and guidelines about safety protocols in tracheostomy have been published over the last few weeks,[2-4] but no case-series are available yet. Clinical data can only be drawn from the 2003 SARS epidemic,[5-7] when patients requiring tracheostomy were managed exclusively with the open surgical technique, as described by the largest case-series of 15 infected patients from Singapore.[6] To date, the appropriateness of tracheostomy in infected patients is still debated in terms of indications, techniques and timing.

We report our preliminary single-centre experience on tracheostomy in SARS-CoV-2 patients, emerging from the hardest-hit Italian region, Lombardy.

METHODS

The study was approved by the Insubria Board of Ethics and included all consecutive patients admitted to the Intensive Care Units (ICUs) of a tertiary-care teaching hospital during the first month of the outbreak, who underwent elective tracheostomy for prolonged mechanical ventilation**.** A dedicated team was created. The number of providers participating in the procedure was limited to the strictly essential members. Tracheostomies were arranged in groups of two or three per session, in order to minimize personal protective equipment (PPE) usage. Healthcare workers wore

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water-resistant gowns, caps, boots, double gloves, goggles, and FFP3 masks providing protection against droplet-based transmission, with full-face transparent shields on top.[2-4]

Percutaneous dilatational tracheostomy (PDT) was performed at the bedside by the most skilled Intensivists. When PDT was contraindicated, open surgical tracheostomy (OST) was performed by two experienced Otolaryngologists, in a negative-pressure operating theatre, except for non-transportable patients who underwent bedside OST. After pre-oxygenation (Oxygen 100% for 2-3 minutes), mechanical ventilation was ceased during tracheal incision to minimize viral aerosolization, paying particular care not to pierce the inflated cuff. To further reduce aerosolization, a complete paralysis was obtained to avoid coughing; suctioning and cautery were also minimized. A cuffed non-fenestrated tracheostomy tube was placed. Stethoscope auscultation was avoided and the confirmation of tracheal tube correct placement relied on end-tidal gas sampling and chest movements. Doffing procedure was performed by team members individually and one at a time, following a standardized sequence to avoid self-contamination, under supervision of a dedicated inspector.[2-3] Immediately afterwards, the staff moved to the changing room for a shower.

RESULTS

Of the about one hundred mechanically ventilated patients admitted to the COVID-19 ICUs of our Institution from the last week of February to mid-April 2020, 32 underwent elective tracheostomy, after a mean intubation period of 15 days (range, 9-21 days). The mean age was 62 years old (range, 32-74 years), with a male to female ratio of 2:1. The technique used was PDT in 10 (31.2%) patients and OST in 22 (68.8%). Procedures were performed at the bedside in 19 (59.4%) cases and in a negative-pressure operating room in 13 (40.6%). No procedure-related mortality was observed while the COVID-19-related mortality rate was 15.6% (5/32 cases) with fatality occurring within a mean period of 7 days after tracheostomy. Neither procedure-related complications nor viral

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transmission to healthcare workers were observed, after a mean follow-up of 21 days (range, 8-37 days). The first post-operative tracheostomy tube change has been performed in 11/32 cases, so far, after a mean period of 14 days (range, 12-18 days). At the time of writing, 8 patients recovered from COVID-19 with negativization of nasopharyngeal swabs plus bronchial aspirate analysis, and decannulation has been possible in one of these cases.

DISCUSSION

The tracheostomy allowed more practical mobilization of patients, lower incidence of unplanned extubation, reduced sedative drugs administration, and facilitated weaning attempts, since patients not tolerating liberation from mechanical ventilation would be rapidly reconnected to the ventilator circuit. The timing of tracheostomy is yet to be defined in such critically ill patients, but early recommendations worldwide seem to suggest waiting at least 14 days of endotracheal intubation in order to avoid clinically futile procedures for patients and prevent healthcare workers from unnecessary exposure risks.[3] In our experience, percutaneous and surgical techniques were comparable in terms of exposure risks and patients' safety, when planned following proper indications.[4] The post-operative care represents another open issue, which should be explored in the next few months, based on evolving body of data gradually available.[3-4] In our experience, circuit disconnections were strictly avoided and only closed in-line suctioning was used. Moreover, a heat and moisture exchanger with viral filter was used once the tracheostomy tube was disconnected from mechanical ventilation. The first post-operative tracheostomy tube change was performed after a mean period of two weeks, wearing appropriate PPE. Prudentially, we maintained a cuffed non-fenestrated tracheostomy tube in all cases, deflating the cuff only after COVID-19 negativization. As a matter of fact, at present, there is no high-level evidence to make recommendations about cuff deflation and decannulation, which, ideally, should be performed once viral load is as low as possible and/or COVID-19 has passed.[3]

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DECLARATION OF INTERESTS

Funding: This was an unfunded study so there is nothing to disclose.

Conflict of Interest: All Authors declare that they have no financial or personal relationships with other people or organizations. No conflicts of interest to disclose.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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AUTHORS' CONTRIBUTIONS:

Mario Turri-Zanoni, MD: study concept and design; writing the manuscript.

Paolo Battaglia, MD: study concept and design; writing the manuscript.

Camilla Czaczkes, MD: data collection and analysis.

Paolo Castelnuovo, MD: data interpretation; critical revision of the manuscript.

Paolo Pelosi, MD: study concept and design; data interpretation.

Luca Cabrini, MD: study concept and design; data interpretation.

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