

Table 1. Early and late complications.

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Bronchoscopy-guided percutaneous tracheostomy during the COVID-19 pandemic

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Background

Percutaneous tracheostomy (PT) is usually indicated as a weaning strategy in patients who require prolonged mechanical ventilation. PT confers an increase in patients' comfort, improves bronchial hygiene, and reduces the need for deep sedation. However, patients with severe acute respiratory distress syndrome (ARDS) secondary to COVID-19 present prolonged and fluctuating periods of hypoxemia, and hemostasis disorders. The aim of the present study is to assess the efficacy and **record the complications associated with performing bronchoscopy-guided PT** during the COVID-19 pandemic.

Methods

Single center, prospective observational study conducted between March of 2020 and February of 2022 in a high-complexity hospital ICU in Buenos Aires, Argentina. All adult patients who underwent elective bronchoscopy-guided PT during the study period were included. The efficacy of the procedure was evaluated based either on the success rate in the execution or in the need for conversion to open technique. Additionally, early and late complications observed were recorded. Due to the lack of universally accepted definitions for PT related complications, the British Thoracic Society criteria was used as a reference*.

Ventilator settings

- VCV, TV: 6-8 ml/kg IBW. FiO₂ 100%
- Swivel connector to maintain ventilation while bronchoscopy
- Induced apnea cycles (with necessary pre-oxygenation)
- Deep sedation: RASS -5 (ketamine / propofol + rocuronium)

Bronchoscopy

- Single-use video bronchoscope
- Both operators (surgeon and bronchoscopist) with clear view of the bronchoscope screen
- Preliminary bronchial toilet was performed to further optimize bronchoscopic vision

Surgical technique

- Transverse cervicotomy above jugular notch
- Blunt dissection of subcutaneous tissue
- Digital opening of the cutaneous muscle of the neck (platysma)
- Divulsion of pretracheal muscles.
- Palpation of tracheal rings.
- Second and third tracheal cartilage recognition
- Tracheal puncture with abbocath 14 G
- Guidewire progression
- Dilation of the anterior aspect of the trachea with a short dilator according to Seldinger technique
- Dilation of the anterior aspect of the trachea with a "horn-type" hydrophilic dilator
- Placement of the tracheostomy tube
- Tracheostomy tube connection to ventilator tubing
- Bronchoscopic verification of cannula placement site

Results

312 bronchoscopy-guided PT were analyzed. 183 were performed in COVID-19 patients and 129 among non-COVID-19 patients. Overall, 64.1% (200) of patients were male, with a median age of 66 (IQR 54 - 74) and sixty-five percent (205) presented at least one comorbidity. Overall, **oxygen desaturation was the main complication observed** (20.8% [65]), being more frequent in the COVID-19 group occurring in 27.3% (50) with a statistically significant difference vs the non-COVID-19 patients' group (11.6% [15]); p<0.01). Major complications such as hypotension, arrhythmias and pneumothorax were more frequently observed among COVID-19 patients as well but with no significant differences. No suspension of the procedure was required in any case.

	All patients (n = 312)	non-COVID-19 (n = 129)	COVID-19 (n = 183)	p value
Male sex, n (%)	200 (64.1%)	79 (61.2%)	121 (66.1%)	0.44
Age, median (IQR)	66 (54 - 74)	68 (53 - 74)	65 (55 - 74)	0.60
BMI, median (IQR)	28 (24 - 32)	26 (23 - 31)	29 (25 - 32)	0.01
APACHE II score, median (IQR)	13 (9 - 18)	14 (8 - 21)	12 (9 - 17)	0.08
MV days prior to tracheostomy, median (IQR)	17 (12 - 21)	13 (9 - 17)	19 (15 - 24)	<0.01
In-hospital mortality, n (%)	84 (26.9%)	44 (32.6%)	40 (22.1%)	0.01

Table 1. Patients' demographic characteristics.

	All patients (n = 312)	non-COVID-19 (n = 129)	COVID-19 (n = 183)	p value
Early complications, n (%)				
Oxygen desaturation	65 (20.8%)	15 (11.6%)	50 (27.3%)	<0.01
Bleeding	23 (7.37%)	10 (7.75%)	13 (7.10%)	1.00
- Type 1	17 (5.45%)	7 (5.43%)	10 (5.46%)	1.00
- Type 2	3 (0.96%)	1 (0.78%)	2 (1.09%)	1.00
- Type 3	3 (0.96%)	2 (1.55%)	1 (0.55%)	0.57
Hypotension	16 (5.13%)	5 (3.88%)	11 (6.01%)	0.56
Arrhythmia	4 (1.28%)	1 (0.78%)	3 (1.64%)	0.66
Non-planned extubation	4 (1.28%)	1 (0.78%)	3 (1.64%)	0.66
Hypertension	3 (0.96%)	0	3 (1.64%)	0.29
Pneumothorax	1 (0.32%)	0	1 (0.55%)	1.00
Atelectasis	1 (0.32%)	0	1 (0.55%)	1.00
Cardiac arrest	1 (0.32%)	1 (0.78%)	0	0.42
Airway injury	0	0	0	-
Esophageal perforation	0	0	0	-
Late complications, n (%)				
Tracheomalacia	5 (1.60%)	2 (1.55%)	3 (1.64%)	1.00
Stoma infection	2 (0.64%)	2 (1.55%)	0	0.17
Tracheal stenosis	0	0	0	-
Tracheoesophageal fistula	0	0	0	-

Table 2. Early and late complications.

Conclusion

Bronchoscopy-guided PT can be considered as an effective and safe procedure in COVID-19 patients. Nevertheless, it is highly remarkable that in the series under study, a great number of COVID-19 patients presented desaturation during the procedure.

* Du Rand IA, Blaikley J, Booton R, Chaudhuri N, Gupta V, Khalid S, et al. British Thoracic Society guideline for diagnostic flexible bronchoscopy in adults: accredited by NICE. Thorax 2013;68 Suppl 1:i1-44.