5. Veyckemans F. Tracheal extubation in children: Planning, technique, and complications. Paediatr Anaesth. 2020;30:331–8.

Alexander Trujillo Mejía [a,b,c,d,*], Carlos Felipe Isaza [c]

[a] *Universidad de Caldas, Faculty of Health Sciences, Division of Pediatric Anesthesia, Manizales, Colombia*
[b] *Universidad de Manizales, Faculty of Health Sciences, Medicine Program, Manizales, Colombia*
[c] *Clinica San Marcel, Anesthesia Department, Manizales, Colombia*
[d] *Children Hospital, Anesthesia Department, Red Cross, Manizales, Colombia*

* Corresponding author.
E-mail: alexander.trujillo@ucaldas.edu.co (A.T. Mejía).

6 June 2020

https://doi.org/10.1016/j.bjane.2020.09.014
0104-0014/ © 2020 Sociedade Brasileira de Anestesiologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Sedation during mechanical ventilation of COVID-19 patients in intensive care units into operating rooms

Dear Editor,

Healthcare is a constitutional right in Brazil, where it is provided by public and private institutions. Its unified health system (SUS – Sistema Único de Saúde, in Portuguese) is universal and free for anyone. The Hospital das Clínicas (HC) is the tertiary teaching hospital of the Faculdade de Medicina da Universidade de São Paulo, Brazil, and is Latin America's biggest hospital complex, with more than two thousand beds. Since March 2020, the Central Institute of HC provided 900 beds, being more than 300 of them dedicated to Intensive Care Units (ICUs), and it became a reference on how to handle the COVID-19 pandemic in Brazil, both for clinical assistance for infected patients and for research and innovation purposes.

In order to offer new venues for ICUs, 34 operating rooms were used to treat one to four patients according to the room size,[1] providing 76 new ICU beds. As the amount of ICU ventilators was not sufficient to serve all the beds available in the hospital, anesthesia machines were used for this purpose. Considering that these devices work as a circuit, it raised concerns about the risk of CO_2 rebreathing, which could lead to narcosis, impairing patient ventilation. However, no adverse events were reported. High flow ventilation was adopted to minimize this risk, preventing the need for frequent exchanges of soda lime.[2] On the other hand, these devices allow the use of inhaled anesthetic drugs such as sevoflurane, that has already proved useful in ICU.[3]

In accordance with what has been reported by different health services around the world, in our practice, we have observed that COVID-19 patients require higher doses of sedatives than usual.[4] The local protocol for patients under mechanical ventilation included the evaluation of the levels of sedation, by the Richmond Agitation and Sedation Scale (RASS), and pain, by the Behavioral Pain Scale (BPS). Deep sedation (RASS -4 or -5) was recommended for patients who needed this target to achieve protective mechanical ventilation, especially in the first 48 hours of critical illness. For patients without a proposal for extubation, sedation should be light to moderate (RASS -2 or -3), associated with daily awakening, and this assessment was performed every two hours.

Midazolam and fentanyl were recommended as initial sedoanalgesia, taking into account that these drugs were efficient at lower costs and required less replacements during the day, minimizing the exposure of the nursing staff to the virus. Continuous infusion of ketamine was as second-line therapy for agitation and pain-control optimization. The sedative recommended for the mild to moderate sedation phase was propofol in low doses. Dexmedetomidine could be used in patients with agitation close to extubation or as a second option in patients in the phase of light to moderate sedation for agitation control. For those patients with agitation or hyperactive delirium, neuroleptics such as quetiapine or risperidone were initiated via nasoenteral tube.

In case of impaired pulmonary compliance, severe ventilator asynchrony, or PaO_2/FiO_2 ratio lower than 150, even with the use of optimal doses of sedative agents and optimization of ventilator settings, the use of neuromuscular blockers was indicated. Cisatracurium was the neuromuscular blocker of choice when necessary, as it is the most studied drug in patients with acute respiratory distress syndrome. However, its use was not recommended for more than 48 hours due to the high risk of weakness and diaphragmatic dysfunction of the critical patient. Continuous administration was preferred over intermittent to minimize staff exposure, although this strategy may result in increased costs. The use of a neuromuscular transmission monitoring was indicated for patients under neuromuscular relaxation drugs. Additionally, for patients under neuromuscular blockade, we included the processed EEG monitoring to achieve adequate sedation levels. The depth of sedation was also monitored for those patients who are not under neuromuscular blockade but require higher doses of sedatives to minimize the agitation.

The adequate sedation for mechanical ventilation during the COVID-19 outbreak, based on scientific evidence and with a rational allocation of available healthcare resources can contribute for better outcomes of critical patients.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Carmona MJC, Quintão VC, Melo BF, André RG, Kayano RP, Malbouisson LMS, Auler-Júnior JOC. Transforming operating rooms into intensive care units and the versatility of the physician anesthesiologist during the COVID-19 crisis. Clinics (Sao Paulo). 2020;75:e2023.
2. Torres MLA, Canhisares FAT, Quintão VC. Management of CO2 absorbent while using the anesthesia machine as a mechanical ventilator on patients with COVID-19. Rev Bras Anestesiol. 2020;70:184–5.
3. Mesnil M, Capdevila X, Bringuier S, Trine P-O, Falquet Y, Charbit J, et al. Long-term sedation in intensive care unit: a randomized comparison between inhaled sevoflurane and intravenous propofol or midazolam. Intensive Care Med. 2011;37:933–41.
4. Orser BA, Wang D-S, Lu W-Y. Sedating ventilated COVID-19 patients with inhalational anesthetic drugs. EBioMedicine. 2020;55.

Igor Pedrosa Saffier *, Rafael P. Kayano

Universidade de São Paulo (USP), Hospital das Clínicas, Faculdade de Medicina, São Paulo, SP, Brazil

* Corresponding author.
E-mail: igor.saffier@hc.fm.usp.br (I.P. Saffier).

Received 27 June 2020; accepted 9 September 2020

https://doi.org/10.1016/j.bjane.2020.09.013
0104-0014/ © 2020 Published by Elsevier Editora Ltda. on behalf of Sociedade Brasileira de Anestesiologia. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Is *Bordetella pertussis* co-infecting SARS-CoV-2 patients?

Bordetella pertussis está coinfectando pacientes com SARS-CoV-2?

Dear Editor,

Bordetella pertussis (B. pertussis) is a gram-negative respiratory coccobacillus that still represents a significant (yet largely preventable) cause of morbidity and mortality worldwide. It is well known that an infection with *B. pertussis* does not confer long-lasting protective immunity; this is also true in case of vaccination, as the antibody levels progressively wane.[1] While *B. pertussis* is generally considered a potentially life-threatening agent in children with less than 3 months of life, there has been increasing evidence that other categories of patients can also be severely affected by the disease, especially seniors.[2]

Table 1 Results of *Bordetella pertussis* testing in 10 COVID-19 patients admitted to the ICU.

Patient	DNA*	IgM§	IgG§	IgA§
1	NEG	2.2	18.8	2.7
2	NEG	9.1	2.1	1.5
3	NEG	3.6	10.9	6.4
4	NEG	0.9	2.5	1.9
5	NEG	6	48.1	2.6
6	NEG	0.5	27.6	7.9
7	–	3.9	5.9	4.5
8	–	0.6	2.9	3.8
9	NEG	1	10.1	3.9
10	NEG	1.3	10	6.5

* PCR assays on nasopharyngeal swab.
§ Serological tests for *B. pertussis*.

As a result, some authors have recently hypothesized the possibility of overlooking a coinfection with *B. pertussis* in patients diagnosed with SARS-CoV-2 pneumonia. The clinical symptoms of these two diseases are in fact partially overlapping; moreover, *Bordetella pertussis* infections are frequently associated with respiratory viruses, including other types of human coronaviruses.[3]

Therefore, we aimed to screen for *B. pertussis* 10 adult patients admitted to the Intensive Care Unit (ICU) of our large tertiary university hospital[4] for the management of severe SARS-CoV-2 pneumonia.

All patients underwent serologies for *B. pertussis*, while 8 were also screened through PCR assays on a nasopharyngeal swab, as molecular testing is the gold standard diagnostic for this disease.[5] These patients were found to have negative PCR for *B. pertussis* DNA (Table 1). Furthermore, although the interpretation of *Bordetella pertussis*' serologies is challenging in the vaccine era, there was no serologic evidence of recent infection in our cohort.

Based on this limited, yet insightful experience, we believe that a coinfection with *B. pertussis* in patients affected by SARS-COV-2 is rather unlikely. Consequently, we would not recommend for these patients an extensive screening for *B. pertussis*.

Funding

None.

Authors' contributions

All authors contributed equally to data collection and manuscript writing.

Conflicts of interest

The authors declare no conflicts of interest.