

## LETTER TO THE EDITOR

### Cough and laryngospasm prevention during orotracheal extubation in children with SARS-CoV-2 infection



Dear Editor,

Little is mentioned about the importance of avoiding cough and laryngospasm during extubation in the Operating Room (OR) in pediatric patients with suspected or confirmed SARS-CoV-2 infection. Coughing is an important source of viral contagion among humans and must be considered a high-risk complication for the health workers. Laryngospasm, more frequent in children than in adults, compels to intervene with positive pressure on the patient's airway increasing the described risk. Different from intubation in the OR, where the anesthesiologist has certain control on the procedure, extubation and emergence from anesthesia have a greater degree of uncertainty.

Recently, 2020 consensus guidelines on pediatric airway management in patients with the coronavirus disease, from the Society for Pediatric Anesthesia's Pediatric Difficult Intubation Collaborative and the Canadian Pediatric Anesthesia Society, have been published.<sup>1</sup> For extubation, they recommend the use of closed in-line suction, deep extubation with techniques to minimize coughing and bucking (total IV anesthesia or dexmedetomidine), the use of protective barrier with a suction device under it to create negative pressure and emerging, and recovering of suspected COVID-19 patients in the OR, followed by direct transfer to the inpatient ward. However, there are some issues not mentioned in the guidelines that could help in the success of the extubation.

The patient position during extubation is associated with different outcomes. H. Jung et al. found that deep extubation in children in lateral decubitus had better SpO<sub>2</sub> values in the first five minutes compared with extubation in supine decubitus (mean and standard deviation 98.3% ± 2.1% and 96.8% ± 2.5%, 95% IC 0.5–2.5,  $p=0.003$ ) and lower incidence of stridor and laryngospasm (2% and 18%, relative risk = 1.9, 95% IC 1.4–2.7,  $p=0.03$ ).<sup>2</sup>

There is evidence about other drugs' effectiveness in preventing cough during extubation. In children, Sanicop et al. reported a 29,9% and 18,92% reduction in laryngospasm and cough when 1.5 mg.kg<sup>-1</sup> intravenous lidocaine was used 3 minutes before extubation compared to placebo.<sup>3</sup> Propofol

0.25 mg.kg<sup>-1</sup> and ketamine 0.25 mg.kg<sup>-1</sup> also have showed being effective for such purpose.<sup>4</sup>

The timing of extubation according to the child's breathing cycle is another point of interest. The author of an educational review about extubation in children mentions that he extubates the child at the end of spontaneous inspiration without suction or positive pressure, arguing that at this point the child's lungs are full of O<sub>2</sub>-enriched air and that the first trans laryngeal movement of air that follows directs all secretions away from the laryngeal structures decreasing the risk of laryngospasm.<sup>5</sup>

According to the former, from the perspective of respiratory complications associated with extubation, it is safer for the health personnel to perform the extubation to a deep anesthetized patient, during spontaneous ventilation at the end of inspiration and in lateral decubitus. Special attention must be given to the use of the medications described for coughing and laryngospasm prevention after the withdrawal of the orotracheal tube.

Finally, health institutions must develop safe extubation protocols to patients and caregivers and perform a close surveillance of adherence and results.

### Conflicts of interest

The authors declare no conflicts of interest.

### References

1. Matava CT, Kovatsis PG, Lee JK, et al. Pediatric Airway Management in COVID-19 Patients: Consensus Guidelines from the Society for Pediatric Anesthesia's Pediatric Difficult Intubation Collaborative and the Canadian Pediatric Anesthesia Society. *Anesth Analg.* 2020;131:61–73.
2. Jung H, Kim HJ, Lee YC, Kim HJ. Comparison of lateral and supine positions for tracheal extubation in children: A randomized clinical trial. *Vergleich der Seiten- und Rückenlage für die tracheale Extubation bei Kindern: Eine randomisierte klinische Studie.* *Anaesthesist.* 2019;68:303–8.
3. Sanicop CS, Bhat S. Efficacy of intravenous lidocaine in prevention of post extubation laryngospasm in children undergoing cleft palate surgeries. *Indian J Anesth.* 2010;54:132–6.
4. Pak HJ, Lee WH, Ji SM, Choi YH. Effect of a small dose of propofol or ketamine to prevent coughing and laryngospasm in children awakening from general anesthesia. *Korean J Anesthesiol.* 2011;60:25–9.

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

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## 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,<sup>1</sup> 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<sub>2</sub> 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.<sup>2</sup> On the other hand, these devices allow the use of inhaled anesthetic drugs such as sevoflurane, that has already proved useful in ICU.<sup>3</sup>

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.<sup>4</sup> 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 nasogastric tube.

In case of impaired pulmonary compliance, severe ventilator asynchrony, or PaO<sub>2</sub>/FiO<sub>2</sub> 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.