Clarifications on Technologies to Optimize Care of Severe COVID-19 Patients

To the Editor

We read with great interest the article by Dr Rubulotta et al[1] and we congratulate the authors for their timely information with regard to strategies and technologies designed to optimize care of patients with severe coronavirus disease (COVID-19). However, we would like to point out several issues that may be relevant to those health care workers who are not routinely exposed to the administration of neuromuscular blocking drugs or monitoring of their effects. The section on "Monitoring Neuromuscular Blockade" (Section C)[1] needs to be more specific. For instance, while we agree that, "results of train-of-four (TOF) should be recorded on the patient's chart on a regular basis," the reader should be guided as to how these results are assessed: are these TOF results obtained subjectively (qualitatively), or objectively (quantitatively)? Furthermore, what do the authors mean by "TOF"? TOF stands for "train-of-four" (a pattern of neurostimulation) and assessment of TOF can mean either TOF ratio (TOFR) or TOF count (TOFC). The 2 terms denote different depths of neuromuscular block that are not interchangeable.[2]

We do have significant reservations about the authors' suggestion that the corrugator supercilii muscle should be the monitoring site of choice. It is true that the sensitivity of the facial muscles to nondepolarizing relaxants closely matches that of the diaphragm. However, it is also true that facial nerve stimulation should not be used to guide reversal and recovery.[3] This is because the eye muscles recover earlier than the upper airway muscles and may falsely suggest that sufficient neuromuscular recovery is present even when the adductor pollicis muscle twitch responses may be weak or nonexistent.[3] The authors also fail to give any guidance as to what TOFR or TOFC the clinician should aim for nor why.

The authors recommend a rapid induction-intubation sequence and consider the 1.2 mg/kg rocuronium as the "overall safest combination" when sugammadex is available. The problem with this statement is that the authors argue that if intubation fails, then neuromuscular block can be reversed quickly by administering sugammadex 16 mg/kg. This dose requires opening of six 200-mg vials for a 70-kg patient; this is not an expeditious procedure, particularly in an emergent setting. And, even if prepared in advance, this dose does not guarantee resumption of spontaneous ventilation if the rocuronium administration was accompanied by hypnotic doses of propofol and opioid typically administered on induction of anesthesia.[4] Thus, the potential for hypoxia, brain damage, or death remains. The authors also suggest, in the event of an anaphylactic reaction to rocuronium, that sugammadex may abort or reverse this process. While there are case reports that support this observation, considerable controversy exists as to the validity of this treatment.[5]

It is also unclear whether "the TOF monitoring handheld device" to which the authors refer is a peripheral nerve stimulator or an objective neuromuscular monitor. The 2 devices are not equivalent, and they provide information of vastly different reliability and clinical usefulness.[2] It also has been shown that subjective (tactile) evaluation of the TOF count is vastly different based on the muscle assessed: qualitative (subjective) evaluation of TOF responses at the eye muscles, for instance, resulted in a >5-fold higher risk of residual paralysis than those patients in whom the hand (adductor pollicis) muscles were assessed subjectively.[6] We therefore believe that clinicians should be very precise in their description of what "monitoring" consists of: is it a subjective (visual or tactile) estimation of responses, or is it based on actual monitoring, which implies measurement and analysis or such responses?

Despite these relatively minor but clinically important shortcomings, we believe the information is timely and helpful to those on the "front line" in caring for patients with COVID-19.

Sorin J. Brull, MD, FCARCSI (Hon)
Department of Anesthesiology and Perioperative Medicine
Mayo Clinic College of Medicine and Science
Jacksonville, Florida
sjbrull@me.com
Aaron F. Kopman, MD
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