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Perioperative Neurocognitive Disorder: Comment

To the Editor:

We read with great interest the review article by Eckenhoff *et al.* on the different approaches used in preclinical perioperative neurocognitive disorder research.[1] In this review, the authors provided data on the various preclinical models used in scientific literature to study perioperative neurocognitive disorder that include molecular, cell culture, brain slices, and animal models. Surprisingly, the possible role of mechanical ventilation as cause of perioperative neurocognitive disorder is not mentioned.

There is growing preclinical and clinical evidence on the relevance of mechanical ventilation–induced neurocognitive damage.[2–5] Various mechanisms have been described to explain how mechanical ventilation–induced alveolar stretching might trigger neuroinflammation: local brain action of systemic lung-derived inflammatory cytokines, afferent neuronal signaling by vagal-mediated dopaminergic lung–brain axis, and histopathologic changes in blood–brain barrier and brain deposition of β-amyloid.[2] These are also known as "brain–lung" cross-talk.[2] Despite the ample preclinical evidence on mechanical ventilation–induced neurocognitive damage, there are no clinical studies designed to evaluate the effect of mechanical ventilation on neuroinflammation and perioperative neurocognitive disorder, but there is evidence that mechanical ventilation duration is a risk factor for neurocognitive impairment in critically ill patients and that, in neurocritical care patients, mechanical ventilation setting is associated with functional outcome.[3,4] Furthermore, a retrospective study in patients resuscitated after out-of-hospital cardiac arrest proved that lower tidal volume associates with better neurocognitive outcome.[5]

We wonder if, considering this evidence, Eckenhoff *et al.* agree that mechanical ventilation–related neuroinflammation might ultimately contribute to perioperative neurocognitive disorder and therefore deserves to be addressed in appropriately designed preclinical and clinical studies.

Competing Interests

The authors declare no competing interests.

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Perioperative Neurocognitive Disorder: Reply

In Reply:

We thank Giordano *et al.*[1] for their interest in our review[2] and perioperative neurocognitive disorder in general.

The role of mechanical ventilation *per se* in perioperative neurocognitive disorder, while feasible, is uncertain, as it is difficult to isolate from the many other features of the perioperative period, such as surgery, anesthesia, or extended critical care. In the specific case of our review, there are few if any reports of mechanical ventilation in preclinical models; thus, we regret that we cannot comment further on the role at this time.

Competing Interests

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Setup of a Dedicated Coronavirus Intensive Care Unit

Logistical Aspects

To the Editor:

Northern Italy is facing a 2019 coronavirus disease (COVID-19) outbreak[1,2]; patients are mainly minimally symptomatic but may develop acute respiratory failure requiring admission to the intensive care unit (ICU).[3] Logistics are fundamental for the safety of both healthcare professionals and ICU patients, and to limit the spread of this highly infective disease.

Once alerted to the first coronavirus case requiring admission to ICU, a section of our unit was emptied and reorganized in 2 h (fig. 1). Access to the unit was limited to the minimal number of healthcare providers and mandatory through a double filter. A "clean filter" for donning is equipped with disposable personal protective equipment (gowns, filter face respirators, visors, hair covers, gloves, boot covers[4]), mirror, chairs, scrubs, waste management material, and hand disinfectants. A "contaminated filter" for doffing is equipped with waste management material, mirror, bathroom to wash before exiting, and hand disinfectants.

For each patient, complete monitoring (blood pressure, oxygen saturation measured by pulse oximetry, end-tidal carbon dioxide, heart rate, respiratory rate, and temperature) is available and duplicated in the "control unit," a clean area separated by a glass wall allowing direct visualization of the patients.

A dedicated aspiration system connects the expiratory valve to wall gas aspiration; this system is also available for a helmet, which is preferred to masks for continuous positive airway pressure/noninvasive ventilation to limit the droplets' spread.[5]

A "laboratory section" includes a dedicated ultrasound machine (images are shared through a Picture Archiving and Communication System's connection available in the unit); disposable fiberbronchoscopes and video-laryngoscopes (fiberbronchoscopy is limited to urgent indications, in order to limit airways opening); point-of-care arterial blood gas and coagulation analyses; transport ventilator; and emergency cart with defibrillator.

The main door of the unit is opened only for the patient's admittance and once per day for garbage evacuation, performed by fully protected professionals and followed by cleaning with sodium hypochlorite 0.1 to 0.5%.

The communication between coronavirus and control units is fundamental both for clinical management and nursing; it is facilitated by an intercom and a dedicated smartphone. All the therapy is prepared outside the coronavirus unit in order to limit the time spent in it, which is physically demanding due to limited transpiration and rebreathing. All the consumable and products needed in the coronavirus unit are provided by nurses and physicians working in the control unit and dropped off in the contaminated filter, where nurses and physicians working inside the coronavirus unit can retrieve them.

A similar smaller and separated structure (buffer zone) admits patients with suspected COVID-19 infection while waiting for results. If positive, the patient is admitted to the coronavirus unit; if negative, to the general intensive care unit.

A dedicated gurney equipped with a StarMed Ventukit helmet (Intersurgical, Italy), two oxygen bottles, bag-mask, monitor, and emergency bag for intubation and chest drain positioning is available for emergency calls in the wards for positive/suspected patients; the intensivist mandatorily wears full protection equipment before leaving the unit.