

Clinical outcomes and a role for dead space and PEEP in critically ill mechanically ventilated COVID 19 patients

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Introduction & aims. Due to the need of understanding the physiological behaviour of critically ill COVID 19 patients to improve outcomes we aimed firstly to search for determinants of daily radiological and gas exchange outcomes and secondly to analyze reasons for clinical deterioration.

Methods. We performed a clinical and physiological study of mechanically ventilated COVID 19 patients. We analyzed lymphopenia, D dimers, LDH, liver enzymes, urea and creatinine. We also analyzed Vt, Ppeak, Pmes, PEEP. We considered outcomes such as oxygenation PaCO₂, physiological dead space, as per its surrogate marker, ventilatory ratio, and chest X ray aeration (software ImageJ©, NIH, Bethesda, USA). Finally, we analyzed 30 episodes of gas exchange deterioration and their mechanisms (fluid overload, infection, barotrauma, airway obstruction or leakage, and self induced lung injury while weaning). The protocol obtained Ethics approval and the relatives of patients gave informed consent. Data was analyzed with Prism Graphpad v5 and expressed as mean and standard deviation and association was analyzed by Person correlation in the case of continuous variables. A p value of <.05 was considered as significant.

Results. We studied 46 pairs of events - outcomes (gas exchange and radiology) and their corresponding parameters the 48 preceding hours, from the first 6 patients receiving invasive mechanical ventilation for severe respiratory failure. We did not find associations between outcomes and laboratory, clinical (fluid balance, diuresis, hemodynamics, respiratory rate). We found a positive association between PEEP and chest radiography area (R 0.40, p<0.05), hypercapnia and ventilatory ratio (R 0.45, p<0.05). And a negative association between PEEP and hipoxemia (R 0.38, p<0.05). The 30 episodes of gas exchange deterioration corresponded in order to fluid overload, nosocomial infections, orotraqueal tube dysfunction, barotrauma, pulmonary embolism and relapse of pulmonary edema.

Discussion. The results are similar to those reported by Bertelli M, et al. (Respir Care. 2021 Sep;66(9):1406-1415) y con Roesthuis, L., et al. (Crit Care 24, 230 (2020)), entre otros. There is a coincidence regarding a role for physiological dead space, and the need to use less PEEP.

Conclusions. We concluded on the need of new biomarkers to predict outcomes, on the use of less PEEP, and on the role of physiological dead space in the management of these patients.