Relationship between longitudinal changes of respiratory mechanics, mechanical power, gas exchange and intensive care outcome in ARDS patients

Dott.ssa GIULIA CATOZZI (1), Dott. TOMMASO POZZI (1), Dott.ssa ISABELLA FRATTI (1), Dott.ssa AGNESE SOLDANO (1), Dott. FEDERICO CUCINOTTA (1), Dott.ssa MARA CHIOCCOLA (1), Dott. FEDERICO DAVÌ (1), Dott.ssa FRANCESCA BECCI (1), Dott.ssa SILVIA COPPOLA (2), Prof. DAVIDE CHIUMELLO (2)(3)

(1) Department of Health Sciences, University of Milan, Milano, Mi, Italia.
(2) Department of Anesthesia and Intensive Care, ASST Santi Paolo e Carlo, San Paolo University Hospital Milan, Milano, Mi, Italia.
(3) Coordinated Research Center on Respiratory Failure, University of Milan, Milano, Mi, Italia.

Argomento: VENTILAZIONE

Introduction: Only few studies explored the clinical course and the accuracy in outcome prediction of clinical and physiological variables in acute respiratory distress syndrome (ARDS) patients. Aims of this study were to describe the clinical course of ARDS during the first three days of mechanical ventilation, to compare physiological variables collected during this period between intensive care unit (ICU) survivors and non survivors and to investigate their association with mortality.

Materials and Methods: Prospective observational study enrolling passive mechanically ventilated ARDS patients; ventilatory setting, respiratory mechanics, gas exchange and hemodynamics were measured at ICU admission and for the following three days of mechanical ventilation in standardized conditions. The variable PaO_2/FiO_2 ratio, driving pressure, alveolar dead space fraction, mechanical power and mechanical power ratio, were fitted in a univariate logistic regression and were entered in a ROC model to evaluate the accuracy in predicting ICU outcome.

Measurements and Main Results: A total of 69 patients were enrolled. The median intensive care length of stay was 15 [11–22] days, with an ICU mortality of 52%. In non survivors, PaO_2/FiO_2 ratio was significantly lower since day 1 up to day 3 and alveolar dead space fraction was significantly higher on day 3 compared to survivors; Mechanical power ratio was higher in non survivors compared to survivors at ICU admission and on each day. Mechanical power ratio was the only variable which remained higher and consistently associated with ICU mortality throughout the study, while the PaO_2/FiO_2 and the alveolar dead space fraction were found significantly associated with ICU mortality on day 3.

Conclusions: The alteration in oxygenation, dead space, and mechanical power ratio should be assessed not at intensive care admission, but during the first days of mechanical ventilation to better predict outcome.