

# THE EFFECT OF POSITIVE PRESSURE VENTILATION ON ACUTE KIDNEY INJURY (AKI) IN COVID-19 ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS). AN OBSERVATIONAL STUDY

<sup>a</sup>M. Brivio, <sup>a</sup>L. Zacchetti, <sup>a</sup>M. Mezzapesa, <sup>b</sup>V. Punzi, <sup>a</sup>A. Martinelli, <sup>a,b</sup>M. Monti, <sup>a</sup>F. Marchesi, <sup>a</sup>L. Scarpa, <sup>a</sup>L. Grazioli, <sup>a</sup>F.L. Lorini

<sup>a</sup>Emergency Dept., <sup>c</sup>Research Foundation, Papa Giovanni XXIII Hospital, Bergamo, Italy. <sup>b</sup>Anesthesia and Critical Care Dept., University of Milano, Italy.

**Background:** acute kidney injury (AKI) is a common complication of COVID-19 ARDS and is associated with greater risk of mortality (1).

We hypothesized that elevated intrathoracic pressure, determined by positive pressure ventilation are associated with increased risk of AKI (2,3).

**Objective:** the aim of the study is to assess the association between hemodynamics and ventilatory parameters and AKI in patients with COVID-19 ARDS.

**Methods:** single center, retrospective, observational study: 140 consecutive COVID-19 ARDS patients were enrolled. AKI was defined according to KDIGO criteria, within 14 days from ICU entry. Demographic characteristics, lab tests, mean arterial pressure (MAP) and central venous pressure (CVP), fluid balance, positive end-expiratory pressure (PEEP) and plateau pressure (Pplat) were compared using Mann Whitney test. Data are presented as median and 95% CI.

**Results:** Among the 140 patients included in the analysis, AKI occurred in 70 (48%) patients and 27 (19%) required continuous renal replacement therapy (CRRT). Patients in AKI group were older, had higher prevalence of obesity, hypertension and diabetes, had lower MAP and received a greater amount of fluid and furosemide compared to patients in non-AKI group (p<0.05). Only a trend toward a greater CVP was observed in patients with AKI, but not statistically significant.

Both PEEP and Pplat were higher in patients with AKI, being the severity of lung disease, (PaO<sub>2</sub>/FiO<sub>2</sub> ratio) not different between the two groups.

**Conclusions:** In our cohort, higher ventilation pressures were associated with increased risk of AKI.

	Non-AKI (n=75)	AKI (n=70)	p
Age (years)	56 (51-66)	63 (56-71)	0.006
BMI (Kg/m <sup>2</sup> )	27 (24-31)	29 (26-33)	0.003
Hypertension, n° (%)	26 (35)	47 (67)	<0.001
Diabetes, n° (%)	12 (16)	21 (30)	0.049
CKD, n° (%)	2 (3)	6 (9)	0.275
SOFA	4 (4-6)	6 (4-8)	<0.001
Steroids, n (%)	22 (29)	12 (17)	0.117
Furosemide, cumulative dose (mg)	40 (0-100)	118 (20-412)	<0.001
MAP (mmHg)	83 (78-89)	80 (75-85)	0.0151
CVP (mmHg)	12 (10-13)	12 (11-14)	0.0596
Fluid balance (ml)	662 (-116-1304)	1250 (673-2256)	<0.0001
PEEP (cmH <sub>2</sub> O)	13 (11-16)	14 (13-16)	0.0276
Pplat (cmH <sub>2</sub> O)	25 (24-28)	27 (25-29)	0.0243
PaO <sub>2</sub> /FiO <sub>2</sub>	128 (102-157)	118 (93-151)	0.3286

- (1) Robbins-Juarez SY et al. Outcome for patients with COVID-19 and acute kidney injury: a systematic review and meta-analysis. *Kidney Int Rep* 2020 Jun 25; 5(8):1149-1160.
- (2) Gabarre et al. Acute kidney injury in critically ill patients with COVID-19. *Int Care Med* 2020. Jul;46(7):13339-1348.
- (3) Scheffold et al. Heart failure and kidney dysfunction: epidemiology, mechanisms and management. *Nat Rev Nephrol* 2016 Oct;12(10):610-23.