

# Covid-19 does not lead to a “typical” Acute Respiratory Distress Syndrome

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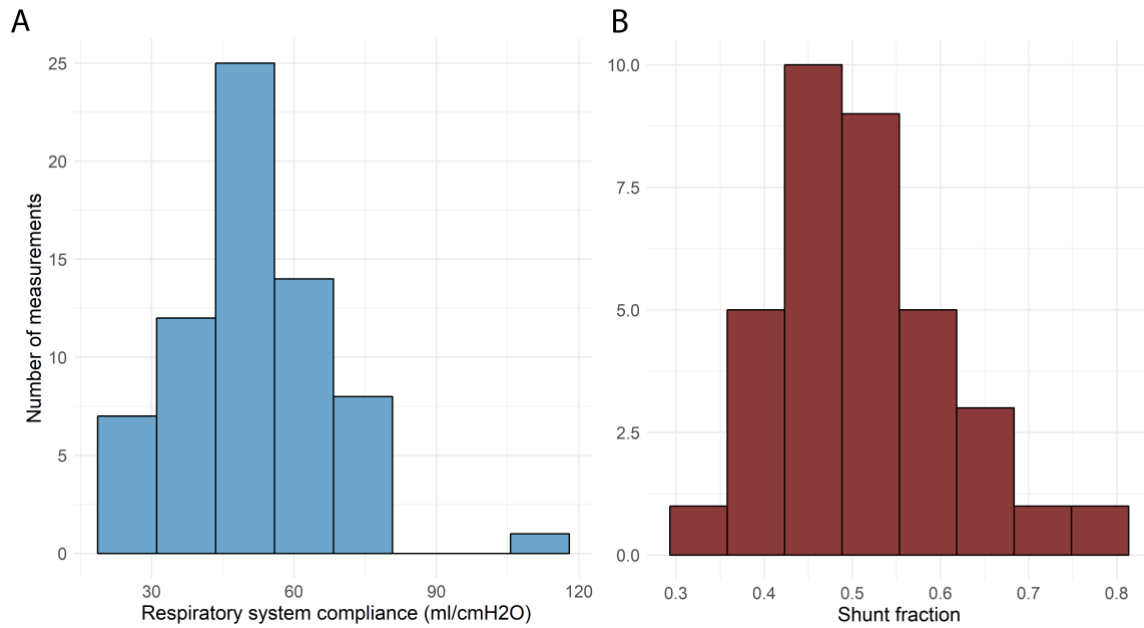
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Dear Editor,

In northern Italy an overwhelming number of patients with Covid-19 pneumonia and acute respiratory failure have been admitted to our Intensive Care Units. Attention is primarily focused on increasing the number of beds, ventilators and intensivists brought to bear on the problem, while the clinical approach to these patients is the one typically applied to severe ARDS, namely high Positive End Expiratory Pressure (PEEP) and prone positioning. However, while fulfilling the ‘Berlin criteria for ARDS’<sup>1</sup> the patients with Covid-19 pneumonia *have a specific disease, with a similar phenotype*. The most peculiar characteristics we are observing (confirmed by colleagues in other hospitals), is the dissociation between their relatively well preserved lung mechanics and the severity of hypoxemia. As shown in our first 12 patients (Figure 1), the respiratory system compliance of  $52.1 \pm 15.4$  ml/cmH<sub>2</sub>O is associated with shunt fraction of  $0.51 \pm 0.10$ . Such a wide discrepancy is virtually never seen in most forms of ARDS. Relatively high compliance indicates well preserved lung gas volume in this patient cohort, in sharp contrast to expectations for severe ARDS.



A possible explanation for such severe hypoxemia occurring in compliant lungs is the loss of lung perfusion regulation and hypoxic vasoconstriction. Actually, in ARDS, the ratio between the shunt fraction to the fraction of gasless tissue is highly variable, with mean  $1.25 \pm 0.80^2$ . In three of our patients with CT scan, however, we measured a ratio of  $2.45 \pm 1.09$ , suggesting remarkable *hyperperfusion* of gasless tissue. If so, the oxygenation increases with high PEEP and/or prone position are not primarily due to recruitment, the usual mechanism in ARDS<sup>3</sup>, but instead, in these patients with a poorly recruitable pneumonia, to the redistribution of perfusion in response to pressure and/or gravitational forces. We should consider that:

1. Early support with measures such as Continuous Positive Airway Pressure (CPAP) or Non Invasive Ventilation (NIV) is potentially counterproductive if patients generate high negative (and unmeasured) intrathoracic pressures (patient self-inflicted lung injury<sup>4</sup>);
2. High PEEP, in a poorly recruitable lung tends to result in severe hemodynamic impairment and fluid retention;
3. Prone positioning of patients with relatively high compliance results in a modest benefit at the price of a high demand for stressed human resources<sup>5</sup>.

After considering that, all we can do ventilating these patients is “buying time” with minimum additional damage: the lowest possible PEEP and gentle ventilation. We need to be patient.

## Bibliography

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