

Specific respiratory system compliance in COVID-19 and non COVID-19 ARDS

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Argomento: COVID-19

Background: Specific respiratory system compliance (CRSspec) is an indicator of the intrinsic elasticity of lung parenchyma, defined as the ratio between the compliance of the respiratory system and the absolute resting volume of the lung. CRSspec is reported to be close to $0.025\text{cmH}_2\text{O}^{-1}$ both in healthy subjects and in ARDS patients, suggesting that the intrinsic elasticity of open pulmonary units in ARDS is normal. In this study, we investigated whether specific elastance in COVID-19 is comparable to typical ARDS.

Methods: We included 221 patients with early typical ARDS and 32 with COVID-19 ARDS. Lung volumes were measured in supine position by a lung CTscan at $5\text{cmH}_2\text{O}$ of airway pressure for COVID-19 patients and at 5 and $45\text{cmH}_2\text{O}$ of airway pressure for typical ARDS patients. Partitioned respiratory mechanics was measured in supine position, PEEP of $5\text{cmH}_2\text{O}$, respiratory rate 16bpm, tidal volume 8mL/kgPBW and computed with standard formulas. Specific respiratory system was calculated as the ratio of respiratory compliance to lung gas volume at PEEP $5\text{cmH}_2\text{O}$.

Main Results: Gas volume was higher in COVID-19 than in typical ARDS ($1.5\text{vs}0.98\text{L}$; $p<0.001$), as well as average lung compliance ($75.1\text{vs}53.5\text{cmH}_2\text{O}$; $p<0.001$). In Fig.1 we reported CRSspec as a function of EELV. Unexpectedly, CRSspec was higher in typical ARDS ($0.044\text{vs}0.032\text{ cmH}_2\text{O}^{-1}$; $p<0.001$). We noticed that specific compliance was between $0.025\text{-}0.040\text{cmH}_2\text{O}^{-1}$ only in COVID-19 patients, while it was higher not only in typical ARDS but also in patients with smaller lung volumes. This finding is likely explained by the presence, in typical ARDS, of intra-tidal recruitment, absent in COVID-19 patients. Indeed, CRSspec is measured at the end of inspiration, when intra-tidal recruitment already occurred, and divided by EELV, *i.e.* a condition in which the lung was de-recruited.

Conclusions: Specific compliance may be a promising indicator of intra-tidal recruitment during mechanical ventilation.

