

Response to PEEP in COVID-19 ARDS With & Without ECMO



There have been conflicting results concerning lung recruitability of COVID-19 acute respiratory distress syndrome (ARDS) and the use of techniques derived from changes in respiratory mechanics and/or gas exchange in response to positive end-expiratory pressure (PEEP) increase. Various factors may explain the heterogeneity of reports regarding recruitability of COVID-19 ARDS. These include time from ARDS onset, the severity of ARDS, reliability of these methods, ventilatory management before evaluation, body mass index etc. Also, COVID-19 ARDS lungs may be less recruitable than classical ARDS, as non-aerated lung regions in these patients may represent alveolar spaces substituted by fibrosis, cellular debris and necrotic tissue rather than atelectasis.

No study has assessed the alveolar recruitability for PEEP selection in COVID-19 patients under extracorporeal membrane oxygenation (ECMO).

In this study, the researchers used computed tomography (CT) to compare lung recruitability and the impact of PEEP on lung aeration in moderate and severe acute respiratory distress syndrome (ARDS) patients with or without ECMO. Study participants included adult COVID-19 patients who had an indication for CT within 72 hours of the onset of ARDS in non-ECMO patients or within 72 h after ECMO onset. A total of 99 patients were included. Of these, 24 patients had severe ARDS under ECMO, 59 had severe ARDS without ECMO, and 16 had moderate ARDS.

Non-inflated lung at PEEP 5 cmH₂O was greater in the ECMO group than in non-ECMO patients. Recruitment induced by increasing PEEP from 5 to 15 cmH₂O was not significantly different between the ECMO and non-ECMO groups, and PEEP-induced hyperinflation was much lower in the ECMO group. The median fraction of recruitable lung mass between PEEP 5 and 15 cmH₂O was 6. Total superimposed pressure at PEEP 5 cmH₂O was higher in ECMO patients at 12 cmH₂O. The hyperinflation-to-recruitment ratio was lower than one in 96% of the ECMO patients, 69% in severe non-ECMO patients and 50% in moderate ARDS patients. Compliance of the aerated lung at PEEP 5 cmH₂O corrected for PEEP-induced recruitment was lower in the ECMO group than in non-ECMO patients.

Overall, findings from this study show that lung recruitability of COVID-19 pneumonia is not significantly different between ECMO and non-ECMO patients. The balance between hyperinflation and recruitment induced by PEEP increase from 5 to 15 cmH₂O appears favourable in nearly all ECMO patients, while this PEEP level is required to counteract compressive forces leading to lung collapse.

Source: [Critical Care](#)
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