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Predicting Impact of Prone Position on Oxygenation in Mechanically Ventilated Patients with COVID-19

Jacob Bell [1], C William Pike [2], Charles Kreisel [1], Rajiv Sonti [1], Nathan Cobb [1]

Affiliations

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Abstract

Objectives: Prone positioning is widely used in mechanically ventilated patients with COVID-19; however, the specific clinical scenario in which the individual is most poised to benefit is not fully established. In patients with COVID-19 respiratory failure requiring mechanical ventilation, how effective is prone positioning in improving oxygenation and can that response be predicted?

Design: This is a retrospective observational study from two tertiary care centers including consecutive patients mechanically ventilated for COVID-19 from 3/1/2020 - 7/1/2021. The primary outcome is improvement in oxygenation as measured by PaO_2/FiO_2. We describe oxygenation before, during and after prone episodes with a focus on identifying patient, respiratory or ventilator variables that predict prone positioning success.

Setting: 2 Tertiary Care Academic Hospitals.

Patients: 125 patients mechanically ventilated for COVID-19 respiratory failure.

Interventions: Prone positioning.

Main results: One hundred twenty-five patients underwent prone positioning a total of 309 times for a median duration of 23 hours IQR (14 - 49). On average, PaO_2/FiO_2 improved 19%: from 115 mm Hg (80 - 148) immediately before proning to 137 mm Hg (95 - 197) immediately after returning to the supine position. Prone episodes were more successful if the pre-prone PaO_2/FiO_2 was lower and if the patient was on inhaled epoprostenol (iEpo). For individuals with severe acute respiratory distress syndrome (ARDS) (PaO_2/FiO_2 < 100 prior to prone positioning) and on iEpo, the median improvement in PaO_2/FiO_2 was 27% in both instances.

Conclusions: Prone positioning in mechanically ventilated patients with COVID-19 is generally associated with sustained improvements in oxygenation, which is made more likely by the concomitant use of iEpo and is more impactful in those who are more severely hypoxemic prior to prone positioning.

Keywords: ARDS; COVID-19; mechanical ventilation; oxygenation; paO2/fiO2; prone positioning.

Figures

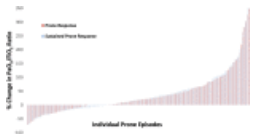

Figure 1. Graphical representation of the percent...

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