

Alveolar–arterial Oxygen Gradient in COVID-19 Pneumonia Initiated on Noninvasive Ventilation: Looking into the Mortality-prediction Ability

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Dear Editor,

We read the work by Gupta et al. on alveolar–arterial (A–a) oxygen gradient as a mortality predictor of coronavirus disease of 2019 (COVID-19) pneumonia initiated on noninvasive ventilation (NIV) with interest.¹ Considering the havoc and crisis caused by COVID-19, the study, although a retrospective one, bears extra value. However, we consider some points of difference that need mention and discussion.

The tension-based oxygen indices like A–a gradient are steady-state-dependent,² complex, and thus deter from accepting it as a solid parameter. Further, the degree of intrapulmonary shunting in critically ill patients does not correlate well with the A–a gradient.³ Coronavirus disease-2019 pneumonia and respiratory failure need special mention as the phenotypes or respiratory mechanics directly relate to parenchymal pathology and even the management of hypoxia.⁴

Second, cardiac output is a determining factor of the A–a gradient. Thus, hemodynamic instability and the need for vasopressors can interfere with interpreting the A–a gradient value. The authors have found hemodynamic instability as an independent factor associated with mortality in their regression analysis that also supports it. Furthermore, the correlation between age and A–a oxygen gradient is well-known.² So, it is worth enquiring whether A–a gradient as a predictor of 28-day mortality still holds in hemodynamically stable age-matched patients.

Nevertheless, the correlation with clinical management with NIV, such as management approach and type of NIV used during the study, could be interesting as the degree of alveolar ventilation directly impacts A–a gradient.⁵ We, therefore, welcome the enlightening opinion from the authors on the above contexts in the background of their study.

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REFERENCES

- Gupta B, Jain G, Chandrakar S, Gupta N, Agarwal A. Arterial blood gas as a predictor of mortality in COVID pneumonia patients initiated on noninvasive mechanical ventilation: A retrospective analysis. *Indian J Crit Care Med* 2021;25(8):866–871. DOI: 10.5005/jp-journals-10071-23917.
- Sharma S, Hashmi MF, Burns B. Alveolar gas equation. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2021. Available from: <https://pubmed.ncbi.nlm.nih.gov/29489223/>
- Cane RD, Shapiro BA, Templin R, Walther K. Unreliability of oxygen tension-based indices in reflecting intrapulmonary shunting in critically ill patients. *Crit Care Med* 1988;16(12):1243–1245. DOI: 10.1097/00003246-198812000-00014.
- Gattinoni L, Chiumello D, Caironi P, Busana M, Romitti F, Brazzi L, et al. COVID-19 pneumonia: Different respiratory treatments for different phenotypes? *Intensive Care Med* 2020;46(6):1099–1102. DOI: 10.1007/s00134-020-06033-2.
- Gray BA, Blalock JM. Interpretation of the alveolar-arterial oxygen difference in patients with hypercapnia. *Am Rev Respir Dis* 1991; 143(1):4–8. DOI: 10.1164/ajrccm/143.1.4.