



Viewpoint

Management of hypoxia in COVID-19: Primum non nocere

Gentle Sunder Shrestha¹, Ankit Rimal¹, Pragma Acharya¹

Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, 44600, Nepal

Abstract

Coronavirus disease has exposed the frailty of health systems all over the globe, especially in low and middle-income countries. Continuing research will embolden our knowledge and clarify controversies associated with management of hypoxia in COVID-19. The aim of this article is to discuss hypoxia in patients with COVID-19, possible modalities for management, including some low-cost and feasible interventions. Surge capacity building and allocation of scarce resources are central to increase capacities to provide patient care while avoiding harm.

Keywords: COVID-19; hypoxia; resource allocation; surge capacity

Hypoxia is the key feature of Corona Virus Disease (COVID-19). The degree of hypoxemia, perplexingly, is not substantiated by the apparent abnormalities in pulmonary mechanics. Suggestions were made, in the early days of this pandemic, to intubate early based on the experience in COVID-19 management in China.¹ Moreover, a higher mortality among intubated patients in Wuhan was attributed to delayed intubation, particularly in patients with “silent hypoxemia” who may not look ill.² In retrospect, the promotion of the early intubation strategy was probably made on the grounds of observable rapid deterioration among patients in a matter of hours and the logistical intricacies involved in carrying out intubation among COVID-19 patients.

Although much argument is ongoing on the existence, and the clinical implication of the H and L phenotypes³,

it has been suggested that, on the extreme front, the mechanics of COVID-19-associated ARDS are similar to the classical ARDS. It would seem counter-intuitive to accept new hypotheses based on a study of limited size against scientifically proven and tested methods in the management of ARDS, that have undergone rigorous scientific scrutiny.

It does not seem plausible that a single oxygen saturation cutoff can be established beyond which the advantages of mechanical ventilation would outweigh its hazards. The concept of doing less is more seems more realistic than ever before. Avoiding a delay in intubation in those who potentially may require invasive ventilation requires constant monitoring. The right time for intubation is determined by the severity of illness and the rate of their clinical decline along with the coexisting conditions. Signs of excessive work

Corresponding author:

Dr. Gentle Sunder Shrestha, MD, FACC, EDIC, FCCP, FNCS

<https://orcid.org/0000-0003-0385-2340>

Intensivist & Anaesthesiologist, Department of Anaesthesiology
Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, Nepal
Email: gentlesunder@hotmail.com

Article History

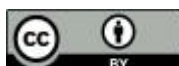
Received 24th July 2020

Accepted 08th August 2020

Published 22nd August 2020

© Authors retain copyright and grant the journal right of first publication with the work simultaneously licensed under [Creative Commons Attribution License CC - BY 4.0](https://creativecommons.org/licenses/by/4.0/) that allows others to share the work with an acknowledgement of the work's authorship and initial publication in this journal.

How to cite this article: Shrestha GS, Rimal A, Acharya P. Management of hypoxia in COVID-19: Primum non nocere. Journal of Society of Anesthesiologists of Nepal (JSAN) 2020;7(1):e305.



of breathing, hypoxemia despite oxygen supplementation and altered mentation indicate the need for an urgent intubation.⁴

Noninvasive ventilation (NIV) strategies have come a long way in reducing the need for invasive mechanical ventilation among patients with acute exacerbations of chronic obstructive pulmonary disease and cardiogenic pulmonary edema. The use of NIV techniques in acute respiratory failure (ARF) is not established. Ferreryo et al in a network meta-analysis, evaluated outcomes in adults with the use of various NIV strategies. Although both helmet and face mask were associated with a lower risk of death, the lower mortality was not statistically significant in patients with severe hypoxemia.⁵ NIV techniques have long been associated with injury due to excessive tidal volumes and high swings in transpulmonary pressures but it seems logical to choose the appropriate NIV technique based on the responsiveness to PEEP and the degree of hypoxemia. For COVID-19 patients with mild ARDS, current WHO guidelines favours a trial of HFNO or NIV as long as the treatment is conducted in a protected environment in hospitals with experience in this technique along with appropriate monitoring.⁶

Prone positioning (PP) in ARDS improves oxygenation by allowing for a more homogeneous inflation/ventilation distribution, modifying chest wall compliance to allow better distribution of gases and altering lung mass distribution and shape. In addition, PP is a feasible alternative to improving oxygenation in spontaneously breathing non-intubated patients in ARF and the use of NIV during PP may avoid intubation in moderate ARDS.⁷ Awake PP appears to be safe in patients requiring NIV in limited cases series and a few observational studies, provided it is not contraindicated.⁸ Currently, because of a paucity of high-quality studies, there is substantial doubt surrounding the effectiveness of awake PP in ARDS associated with COVID-19. However, as tempting as it is to use such an easy intervention out of compassion, the need to closely monitor these patients, while protecting healthcare staff from exposure, is of paramount importance.

As the proverb goes, necessity is the mother of invention. Mechanical ventilators are a rare resource during these trying times. It is encouraging to learn the efforts by local inventors to design and manufacture ventilators. However, for the safe incorporation of these local innovations into clinical practice, proper human clinical trials may be justifiable.

COVID-19 predisposes to thromboembolic events and prophylactic thromboprophylaxis is recommended for hospitalized patients with COVID-19.⁶ Dexamethasone use in hospitalized COVID-19 patients receiving either mechanical ventilation or supplemental oxygen lowered 28-day mortality.⁹ The drug is in the WHO list of essential medicines and is readily available at low cost. These interventions are not resource-intensive and can be expected to improve outcomes among patients admitted with COVID-19, allowing other scarce resources to be allocated to the critically ill.

As with most low middle income countries (LMICs), we are in shortage of health resources, human as well as logistics. Focusing surge capacity on escalating the ability to manage critically ill patients within the existing infrastructure, providing short-term training to health personnel and ensuring availability of proper personal protective equipment would be invaluable.¹⁰ For a better response in future pandemics, current shortcomings need to be acknowledged and reviewed while policy changes need to be ensured. It would be beneficial to focus on pre-emptive action rather than a reaction to a problem.

The Hippocratic injunction: *Primum non nocere* holds true while managing these patients. It is essential to ensure that there is no delay in initiation of oxygen therapy in hypoxemic patients. Prevention of premature intubation in a COVID-19 patient who is not hypoxemic is justified, since outcome among prolonged mechanically ventilated patients is poor. Equally important is early weaning from mechanical ventilation in patients who recover, to allow the allocation of the ventilator to another patient who requires it. Awake PP with or without NIV can be explored with a low threshold for intubation, if the patient were to deteriorate. Steroids and thromboprophylaxis are cheap and effective measures in their respects. Consistent availability of proper personal protective equipment should be guaranteed for all health care personnel. Monitoring is critical.

Oxygen therapy is the mainstay of treatment in hypoxemia associated with COVID-19. Various modalities to address hypoxemia are available, each with their own benefits and risks and thus the need to individualize them for each patient. Prone positioning, thromboprophylaxis and steroids are low-cost interventions of established benefit. In a resource-limited country like ours, the primary focus while treating hypoxemia in COVID-19 should aim at proper and judicious allocation of available limited resources.

Conflict of interests The authors have filled the ICMJE conflict of interest form and declared that they have nothing to disclose.

Acknowledgement None

Sources of funding None

Peer review exempted (view point section).

References

1. Zuo M, Huang Y, Ma W, Xue Z, Zhang J, Gong Y, et al. Chinese Society of Anesthesiology Task Force on Airway Management. Expert Recommendations for Tracheal Intubation in Critically Ill Patients with Novel Coronavirus Disease 2019. *Chin Med Sci J*. 2020;35(2):105-9. <https://doi.org/10.24920/003724> [PMid:32102726] [PMC Full-text]
2. Meng L, Qiu H, Wan L, Ai Y, Xue Z, Guo Q, et al. Intubation and Ventilation amid the COVID-19 Outbreak: Wuhan's Experience. *Anesthesiology*. 2020;132(6):1317-32. <https://doi.org/10.1097/ALN.0000000000003296> [PMid:32195705] [PMC Full-text]
3. 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):1099-102. <https://doi.org/10.1007/s00134-020-06033-2> [PMid:32291463] [PMC Full-text]
4. Berlin DA, Gulick RM, Martinez FJ. Severe Covid-19. *N Engl J Med*. 2020 May 15;doi: 10.1056/NEJMcp2009575. <https://doi.org/10.1056/NEJMcp2009575> [PMid:32412710]
5. Ferreyro BL, Angriman F, Munshi L, Del Sorbo L, Ferguson ND, Rochwerf B, et al. Association of Noninvasive Oxygenation Strategies With All-Cause Mortality in Adults With Acute Hypoxemic Respiratory Failure: A Systematic Review and Meta-analysis. *JAMA*. 2020;324(1):1-12. <https://doi.org/10.1001/jama.2020.9524> [PMid:32496521]
6. WHO. Interim guidance on clinical management of COVID-19 [Internet]. WHO; 2020. Available from: <https://www.who.int/publications/i/item/clinical-management-of-covid-19>. Accessed on July 22, 2020.
7. Ding L, Wang L, Ma W, He H. Efficacy and safety of early prone positioning combined with HFNC or NIV in moderate to severe ARDS: a multi-center prospective cohort study. *Crit Care*. 2020;24(1):28. <https://doi.org/10.1186/s13054-020-2738-5> [PMid:32000806] [PMC Full-text]
8. Koeckerling D, Barker J, Mudalige NL, Oyefeso O, Pan D, Pareek M, et al. Awake prone positioning in COVID-19. *Thorax*. 2020 Jun 16;thoraxjnl-2020-215133. doi: 10.1136/thoraxjnl-2020-215133. <https://doi.org/10.1136/thoraxjnl-2020-215133> [PMid:32546571]
9. Horby P, Lim WS, Emberson JR, Mafham M, Bell JL, Linsell L, et al. Dexamethasone in Hospitalized Patients with Covid-19 - Preliminary Report. *N Engl J Med*. 2020 Jul 17. doi: 10.1056/NEJMoa2021436. <https://doi.org/10.1056/NEJMoa2021436> [PMid:32678530] [PMC Full-text]
10. Paneru HR. Intensive care units in the context of COVID-19 in Nepal: current status and need of the hour. *Journal of Society of Anesthesiologists of Nepal*. 2020;7(1):e291. [Full-text]