

Conscious Proning or Mixed Positioning for Improving Oxygenation—COVID-19 Bring Many Changes!

Rakesh Garg

Keywords: Awake proning, Conscious proning, Hypoxemia, Oxygenation.

Indian Journal of Critical Care Medicine (2020); 10.5005/jp-journals-10071-23624

The present pandemic of coronavirus diseases (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has brought new insights for clinical management.¹ Evidence is emerging for the various domains of clinical management of this novel disease. Hypoxemia is one of the common manifestations in patients with COVID-19. Many conventional understandings and management strategies for hypoxemic respiratory failure due to COVID-19 needed modifications given different underlying etiologies.² Conventionally, patients with severe respiratory compromise require mechanical ventilatory support. For refractory hypoxemia, one of the lung recruitment strategies remains prone to ventilation under sedation or even neuromuscular blockade.^{3,4} But the concept of awake or conscious proning has been strengthened for hypoxemic respiratory failure in COVID-19 patients.⁵⁻⁷ Its proposed beneficial effect is due to lung recruitment, the opening of atelectatic alveoli, less ventilation-perfusion mismatch, and reduced intrapulmonary shunt.⁸

This issue of the journal publishes a retrospective observational study on 15 patients for the role of awake prone positioning in COVID-19 patients requiring oxygen therapy.⁹ Though small studies and case series have reported beneficial effects, many aspects of the conscious proning need to be researched further for definite evidence. Is conscious proning beneficial to all COVID-19 patients with hypoxemia at all stages of lung pathology? Is the prone position the only answer? The evidence related to duration, intermittent vs. continuous proning, oxygen quantum and delivery device, escalation vs de-escalation oxygen therapy, patient selection, etc., need to be answered.

The pneumonitis in COVID-19 may be in the variable phase. The response to proning shall depend on lung compliance and recruitability.^{5,8} The differential beneficial effect has been reported in various reported literature for conscious proning in COVID-19 patients. In the early phase wherein lung compliance is high with minimum recruitability, the response of awake proning may not be sustained. However, when COVID-19 severity progresses, the lung gets less compliance and thus the feasibility of recruitability and probably sustained beneficial response to proning.^{5,8} So, it is desirable to select the patients who would benefit, based on clinical assessment, imaging, or some surrogate markers. It needs to be emphasized that proning should not be considered as the sole strategy to improve the oxygenation. The awake proning needs to be supplemented with other timely strategies like oxygen supplementation, chest physiotherapy, steroids, anticoagulants, appropriate use of indicated antibiotics, etc.¹⁰⁻¹² The authors report that partial pressure of arterial oxygen:the fraction of inspired oxygen ($\text{PaO}_2:\text{FiO}_2$) improved gradually over days with proning, but it needs to be emphasized that other interventions were also

Department of Onco-anesthesia and Palliative Medicine, All India Institute of Medical Sciences, New Delhi, India

Corresponding Author: Rakesh Garg, Department of Onco-anesthesia and Palliative Medicine, All India Institute of Medical Sciences, New Delhi, India, Phone: +91 9810394950, e-mail: drrgarg@hotmail.com

How to cite this article: Garg R. Conscious Proning or Mixed Positioning for Improving Oxygenation—COVID-19 Bring Many Changes! *Indian J Crit Care Med* 2020;24(10):893–894.

Source of support: Nil

Conflict of interest: None

initiated in these patients.⁹ In the reported study, the mean oxygen saturation (SpO_2) was 80% on admission for initiation of proning. This is primarily due to the absence of symptoms and so such patients are rightly labeled as happy hypoxic.¹⁰ The awareness of early identification of respiratory compromise needs to be made so that timely management without hypoxemic adverse effects occurs. So proning should be considered as one of the useful strategies among the multimodal approach for COVID-19 (though most remains experimental and being used on compassionate grounds).

In the reported study, the authors have not used high-flow nasal cannula but still observed the beneficial effect of prone positioning.⁹ The oxygen supplementations remain an important strategy while proning. In patients with low oxygen saturation, a stepwise approach is suggested, but it needs further research to assess for the choice of escalating or de-escalating approach for oxygen therapy. The escalating approach is the norm in most of the reported literature, but it may delay achieving the target acceptable oxygen levels. The de-escalation approach shall provide rapid achievement of the target oxygen levels but concerns of hyperoxia and increased dispersion and viral contamination-related issues remain. The concern for such a strategy remains but can be mitigated by using a surgical mask for patients, appropriate level protective equipment by healthcare workers, cohorting of the patient, and patient management in a negative pressure environment or with appropriate air exchanges.⁸ Also, hyperoxia-related systemic effects occur after prolonged duration. The use of high flows and then de-escalating to target levels also need to be researched further. Many aspects related to oxygenation need to be individualized. The optimal timing and criteria for discontinuing prone ventilation are unclear and should be performed on an individualized basis. The target oxygen saturation needs to be individualized as some patients may warrant a lower target (e.g., patients with a concomitant acute hypercapnic respiratory failure

like in chronic obstructive airway disease) and others may warrant a higher target (e.g., pregnancy).⁸ Also, the patients of COVID-19 present with fluctuations in the oxygen levels. It goes to nadir when a person is turned supine or feeding. The status of oxygen supplementations needs to be kept dynamic and strategies applied accordingly.

The “proning” has become the buzz word for positioning in COVID-19 patients.^{4,5,7,13} But other body postures like lateral and head up are also beneficial though to different levels as compared to the supine position. So, the protocol of proning needs to be redefined and mixed position protocol needs to be emphasized rather than just labeling it as awake proning. The positioning protocol as awake positioning: sit/head up-lateral recumbent-prone OR sit/head up-rotate-prone for improving oxygenation in COVID-19 patients needs to be further researched.¹⁴ Since the patient is awake, prolonged full prone may not be feasible all the times, so the effect of other positions like semi-prone and reverse Trendelenburg in prone also needs to be studied to extend the duration of beneficial positioning. The literature has not reported 100% beneficial effects of proning. The patient selection criteria are primarily based on conscious levels and the hemodynamic status. So, the patient selection and its futility needs to be decided. At times, the patient may deteriorate (worsening hypoxemia, increased work of breathing, hemodynamic instability) in a prone position. So, it is prudent to assess the patient after 10–15 minutes of proning for responders vs nonresponders vs worseneres and in case of deterioration, another position needs to be tried.^{15,16}

The COVID-19 manifestations include cough, myalgia, chest pain along with other features. These may affect respiratory mechanics. The need for this symptom management including drugs like opioid should be further elucidated. The opioids may not only provide pain relief but also suppress the cough and thus reduce the risk of viral contamination but need to be studied further for their beneficial effects.¹⁷

So, to conclude conscious proning with spontaneous or assisted ventilation has emerged as a useful and easy-to-execute intervention in COVID-19 patients. More robust prospective randomized trials are required for a pragmatic approach for an overall beneficial effect of positioning protocols as an integrated multidimensional approach.

REFERENCES

- Lu H, Stratton CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan China: The mystery and the miracle. *J Med Virol* 2020;92(4):401–402. DOI: 10.1002/jmv.25678.
- Weiss SL, Peters MJ, Alhazzani W, Agus MSD, Flori HR, Inwald DP, et al. Surviving sepsis campaign: guidelines on the management of critically ill adults with coronavirus disease 2019 (COVID-19). *Intensive Care Med* 2020(S1):1–34. DOI: 10.1007/s00134-019-05877-7.
- Guérin C, Reignier J, Richard JC, Beuret P, Gacouin A, Boulain T, et al. PROSEVA study group: prone positioning in severe acute respiratory distress syndrome. *N Engl J Med* 2013;368(23):2159–2168. DOI: 10.1056/NEJMoa1214103.
- McNicholas B, Cosgrave D, Giacomini C, Brennan A, Laffey JG. Prone positioning in COVID-19 acute respiratory failure: just do it? *Br J Anaesth* 2020;125(4):440–443. DOI: 10.1016/j.bja.2020.06.003.
- Koeckerling D, Barker J, Mudalige NL, Oyefeso O, Pan D, Pareek M, et al. Awake prone positioning in COVID-19. *Thorax* 2020;75(10):833–834. DOI: 10.1136/thoraxjnl-2020-215133.
- Thompson AE, Ranard BL, Wei Y, Jelic S. Prone positioning in awake, non-intubated patients with COVID-19 hypoxemic respiratory failure. *JAMA Int Med* 2020. e203030. DOI: 10.1001/jamainternmed.2020.3030.
- Elharrar X, Trigui Y, Dols AM, Touchon F, Matinez S, Prud'homme E, et al. Use of prone positioning in non-intubated patients with COVID-19 and hypoxemic acute respiratory failure. *JAMA* 2020;323(22):2336–2338. DOI: 10.1001/jama.2020.8255.
- Slessarev M, Cheg J, Ondrejicka M, Arntfied R, The Critical Care Western Research Group. Patient self-proning with high flow nasal cannula improves oxygenation in COVID-19 pneumonia. *Can J Anesth* 2020;67:1288–1290.
- Singh P, Jain P, Deewan H. Awake prone positioning in COVID-19 patients. *Indian J Crit Care Med* 2020;24(10):914–918.
- Caputo ND, Strayer RJ, Levitan R. Early self-proning in awake, non-intubated patients in the emergency department: a single ED's experience during COVID-19 pandemic. *Acad Em Med* 2020;27(5):375–378. DOI: 10.1111/acem.13994.
- Xu Q, Wang T, Qin X, Jie Y, Zha L, Lu W. Early awake prone position combined with high-flow nasal oxygen therapy in severe COVID-19: a case series. *Crit Care* 2020;24(1):250. DOI: 10.1186/s13054-020-02991-7.
- Shang Y, Pan C, Yang X, Zhong M, Shang X, Wu Z, et al. Management of critically ill patients with COVID-19 in ICU: statement from front-line intensive care experts in Wuhan, China. *An Intensive Care* 2020;10(1):73. DOI: 10.1186/s13613-020-00689-1.
- Scaravilli V, Grasselli G, Castagna L, Zanella A, Isgrò S, Lucchini A, et al. Prone positioning improves oxygenation in spontaneously breathing nonintubated patients with hypoxemic acute respiratory failure: a retrospective study. *J Crit Care* 2015;30(6):1390–1394. DOI: 10.1016/j.jcrc.2015.07.008.
- Jiang LG, LeBaron J, Bodnar D, Caputo ND, Chang BP, Chiricolo G, et al. Conscious proning: an introduction of proning protocol for non-intubated, awake, hypoxic emergency department COVID-19 patients. *Acad Em Med* 2020;27(7):566–569. DOI: 10.1111/acem.14035.
- Roca O, Messika J, Caralt B, García-de-Acilu M, Sztrymf B, Ricard JD, et al. Predicting success of high-flow nasal cannula in pneumonia patients with hypoxemic respiratory failure: the utility of the ROX index. *J Crit Care* 2016;35:200–205. DOI: 10.1016/j.jcrc.2016.05.022.
- Riedel T, Richards T, Schibler A. The value of electrical impedance tomography in assessing the effect of body position and positive airway pressures on regional lung ventilation in spontaneously breathing subjects. *Intensive Care Med* 2020;31(11):1522–1528. DOI: 10.1007/s00134-005-2734-x.
- Mamne S, Yousuf B, Shamsah M. Transdermal fentanyl patch: an approach to enhance tolerance of conscious proning in COVID-19 patients. *J Opioid Manag* 2020;16(4):237–238. DOI: 10.5055/jom.2020.0576.