

LETTER

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Protocol for awake prone positioning in COVID-19 patients: to do it earlier, easier, and longer

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Dear editor,

We read with great interest the brief report by Xu and colleagues [1] about the effects of early awake prone positioning (PP) combined with high-flow nasal cannula (HFNC) in ten coronavirus disease 2019 (COVID-19) patients. However, some details in the use of PP in non-intubated patients with COVID-19 need to be further clarified based on recently published data.

First, which criteria should we use to identify appropriate candidates for awake PP in COVID-19? Xu et al. used PFR < 300 mmHg as their only criteria. Other studies have not used blood gas analysis. A study of 50 COVID-19 patients treated with awake PP used SpO₂ < 93% despite supplemental oxygen (rather than PFR) as an indication to trial PP [2]. Replacing PFR with SpO₂/FiO₂ (and removing the need for PEEP) may allow COVID-19-related ARDS to be diagnosed in patients on HFNC or face-mask oxygen without the need for NIV or blood gases. This may have advantages in healthcare facilities with more limited resources. We suggest considering awake PP in patients with SpO₂ > 94% requiring either 0.3–0.6 FiO₂ (with HFNC or NIV) or an oxygen flow rate of 2–10 L/min (with a face-mask or nasal cannulae). These oxygen requirements correspond to an SpO₂/FiO₂ range of 140–

315 which approximates a PFR 100–300 mmHg, indicating mild to moderate ARDS [1, 2].

Second, what is the optimal duration of awake PP? In the report by Xu et al. [1], the target time of PP was more than 16 h per day. However, the actual duration was not reported. In a study for intubated COVID-19 patients, prolonged PP of 36 h was associated with better PFR improvement and this was maintained after supine positioning [3]. Therefore, although a duration of 2–3 h of PP is tolerable for awake COVID-19 patients [4, 5], a pragmatic approach which allows patients to lie prone as long as they feel comfortable seems reasonable [1, 4].

Finally, how should we monitor for failure of awake PP and avoid delay in intubation? Xu et al. [1] do not describe the use of any exclusion criteria when considering awake PP. Patients should be monitored with pulse oximetry for 30 min following awake PP as SpO₂ may fall temporarily and a judgement must be made whether to continue. A sustained PFR < 100 mmHg or SFR < 140 mmHg after PP may indicate need for intubation [2, 4, 5].

In summary, a protocol for an early recognition and better monitoring of awake PP in this population is proposed in Fig. 1.

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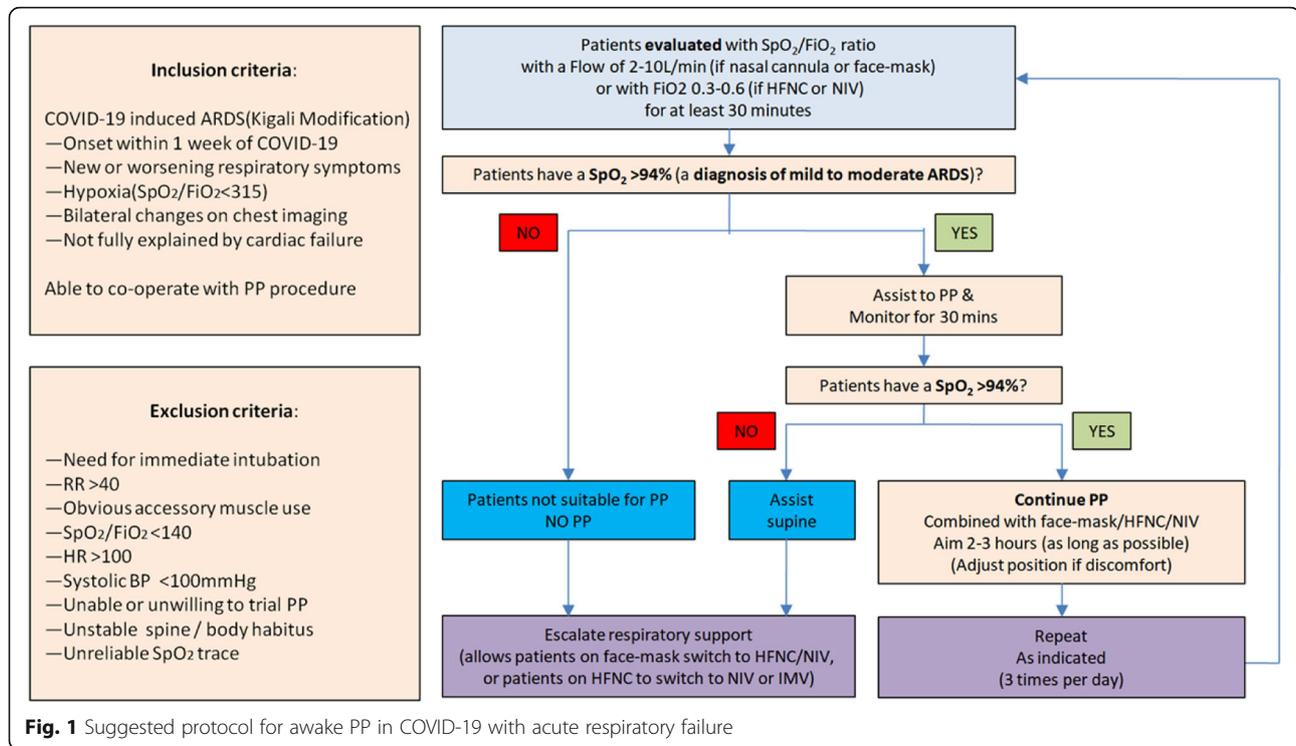


Fig. 1 Suggested protocol for awake PP in COVID-19 with acute respiratory failure

Authors' response

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Dear editor,

We would like to thank Dr. Bower for their insightful comments on our paper recently published in *Critical Care* [1]. Studies have shown that 78% of coronavirus disease 2019 (COVID-19) patients exhibit hypoxaemia and that 32% of patients need ventilation due to acute respiratory failure [6]. Prone position (PP) ventilation is usually used as a salvage treatment for COVID-19 in critical cases. In our study, awake PP was applied early to reduce the requirement for respiratory support, tracheal intubation rate, and progression to a critical situation.

In clinical cases, many patients with respiratory failure/hypoxaemia do not present symptoms of dyspnoea (silent hypoxaemia), especially elderly patients [7], and their SpO_2 is greatly affected by FiO_2 . Therefore, PP may be delayed if SpO_2 and RR are used as criteria. In our study, a P/F ratio ≤ 300 mmHg was used as the only criterion, whereas SpO_2 and respiratory rate were used as

reference indicators. We also agree with Dr. Bower's view that this approach may require additional resources.

For the timing of conversion to invasive ventilation, since the therapy is applied to avoid organ damage secondary to hypoxaemia, we focused on SpO_2 as the target of oxygen therapy rather than the P/F ratio, which reflects the degree of lung injury. There was a patient with a P/F ratio ≤ 100 mmHg who avoided intubation in our study. Siemieniuk et al. [8] recommended that a target SpO_2 range of 90–94% seems reasonable for most patients. A previous programme proposed a COVID-19 SpO_2 maintenance target in non-pregnant adult patients $\geq 90\%$ and 92–95% for pregnant patients [9]. In our research, we changed the criteria to invasive mechanical ventilation for a patient with SpO_2 less than or equal to 90% at an FiO_2 of 100% for at least 5 min or $SpO_2 > 90\%$ but with high respiratory load, respiratory acidosis, haemodynamic instability, multiple organ dysfunction, and mental disorders.

The specific duration of the PP should be determined with consideration of the local medical resources and the patient's condition. Each of our treatment units consisted of a nurse, a respiratory therapist, and a

psychotherapist, so they could closely monitor conditions that can prolong the prone position. However, there were difficulties in healthcare facilities without sufficient staff.

Finally, comprehensive treatment of COVID-19 may be more important. Our treatments could include convalescent plasma, tocilizumab, and anticoagulant therapy to reduce the duration of virus replication and respiratory support. Therefore, early awake PP can effectively prevent hypoxaemia in patients with severe COVID-19.

Abbreviations

COVID-19: Coronavirus disease 2019; PP: Prone position; SpO₂: Peripheral blood oxygen saturation; FiO₂: Fraction of inspired oxygen

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