

Should awake proning be used before continuous positive airway pressure therapy for respiratory support in COVID pneumonia

As of May 31, 2020, there are 5,934,936 confirmed cases of COVID-19 with 367,166 deaths. This pandemic has placed a severe strain on intensive care units (ICUs) with demand outstripping capacity. At the start of the pandemic, early intubation and mechanical ventilation was the preferred approach. This seems to have been due to concerns that continuous positive airway pressure (CPAP) and high-flow nasal oxygen (HFNO) might increase the risk of cross-infections by being aerosol-generating procedures (AGPs). In addition, there was no proven mortality benefit compared to low-flow oxygen. However, patients undergoing mechanical ventilation suffered high mortality rates, ranging from 37% to 88%.^[1,2]

COVID-19 is a new illness that causes pulmonary alveolar damage as well as microvascular thrombi. In addition, out of all patients admitted with COVID pneumonitis, about two-third of patients experience lung injury with high compliance and high ventilation/perfusion (V/Q) mismatch, and in approximately one-third of cases, it progresses to ARDS. In patients with patchy infiltrates and high lung compliance, the application of positive pressure might potentially lead to worsening of lung injury.^[1,3]

Prone positioning improves V/Q matching and survival in patients with moderate-to-severe ARDS who need mechanical ventilation and has also been tried in awake adult patients. In the supine position, there is a V/Q mismatch, especially in the dorsal-dependent part of the lung due to posterior basal consolidation and dependent distribution of secretions. Insufficient vasoconstriction in response to hypoxemia may also play a role. On prone positioning, dorsal perfusion is maintained while dorsal ventilation improves, improving V/Q matching. Recently, two small observational studies involving 24 patients with mild respiratory failure (French study) and 15 patients with mild-to-moderate ARDS (Italian study) have reported on the effects of awake proning in patients with COVID pneumonia. Awake proning led to improved oxygenation in both studies.^[4]

At one of our institutions, awake proning was performed mostly on a dedicated respiratory ward or ICU in 12 patients, in whom oxygen saturations of more than 92% could not be maintained by at least 40% inspired oxygen. Four patients (33%) required mechanical ventilation and nine (75%) were discharged home. One patient experienced temporary desaturation due to disconnection of oxygen. Awake proning is feasible on a respiratory ward and generally well tolerated except in those who were unable to self-prone or in morbidly obese patients.

Recent guidance issued by the British Thoracic Society (BTS),^[5] the Irish Thoracic Society, as well as the Italian and German guidelines regarding treatment of respiratory failure due to COVID pneumonia recommends the use of CPAP.^[6] The BTS guidance also mentions that CPAP starting pressure outside the ICU to be 10 cm of water and can be increased to 15 cm. Awake proning is recommended only in those not suitable for escalation.

In our experience in patients with COVID pneumonia with hypoxemic respiratory failure, CPAP therapy when used either to avoid intubation or as ceiling of care failed to achieve its objective in at least two-third of cases. When CPAP failed, withdrawing CPAP and delivering end-of-life care posed difficulties both for patients and nursing staff.

Further, our data show that when machines without oxygen blender are used to deliver CPAP, 15 L/min of entrained oxygen was able to provide a maximum of 60% oxygen and 30 L of oxygen had to be entrained to achieve oxygen concentration of more than 80%. This is important in the context of a number of reports in North America and Europe of hospitals nearly running out of oxygen with potentially fatal consequences for patients. In contrast, at flow rate of 15 Litre/minute via a nonrebreath mask would provide oxygen concentration of more than 80%.

When compared with CPAP and HFNO, awake proning is not an AGP, is relatively easy to institute, and is likely to use less oxygen than CPAP or HFNO. Moreover, a high proportion of COVID patients are likely to be elderly and to be admitted to the nonrespiratory ward. Awake proning is likely to be a more feasible approach than CPAP or HFNO in these patients and would be of great value in resource-poor countries around the world. We therefore think that patients with COVID pneumonia with patchy consolidation (consistent with V/Q mismatch) who need more than 40% oxygen to maintain oxygen saturation of more than 94 should be offered proning as a first step. A proportion of these patients are likely to fail and may need mechanical ventilation or CPAP as appropriate.

A randomized study comparing standard therapy with awake proning would be useful. In the meantime, it is important that we learn from our collective experiences to formulate a more physiology-based approach and consider awake proning as the first step before using CPAP.

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Conflicts of interest

There are no conflicts of interest.

**Milind Sovani¹, Arun Khanna¹,
Dipansu Gosh², Ben Messer³, Simon Wharton⁴**

¹Department of Respiratory Medicine, Nottingham University Hospitals NHS Trust, Nottingham, England, ²Department of Respiratory Medicine, Leeds Teaching Hospitals NHS Trust, Leeds, England, ³Department of Respiratory Medicine, Newcastle Upon Tyne Hospitals NHS Trust, Newcastle Upon Tyne, England, ⁴Department of Intensive Care Medicine, Birmingham Heartlands Hospitals NHS Trust, Birmingham, England
E-mail: arun.khanna@nuh.nhs.uk

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