Case report

Use of awake proning to avoid invasive ventilation in a patient with severe COVID-19 pneumonitis

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SUMMARY
A 60-year-old man with swab-positive COVID-19 and extensive ground-glass change seen on CT imaging was successfully managed on our COVID-19 high-dependency unit with only low-flow oxygen and strict awake proning instructions. He was successfully weaned off oxygen entirely without any requirement for non-invasive or invasive ventilation and made a recovery to be discharged home after an 18-day hospital stay.

BACKGROUND
The current COVID-19 pandemic presents a considerable challenge to healthcare systems worldwide. Given the nature and prevalence of this novel coronavirus, the issue of resource management (including ventilators and oxygen supplies) has become of paramount importance. In addition, there is a need to find ways to avoid intubation where possible as ventilated patients with COVID-19 typically have poor outcomes when placed on mechanical ventilation.1 We present a case of a 60-year-old man who developed extensive COVID-19 pneumonitis who was successfully managed with low-flow oxygen (up to 12 L/min given via a non-rebreather mask) and awake proning and was able to be discharged home. This avoided the need for the higher oxygen flows associated with both non-invasive and invasive ventilations and the increased risks these treatments present to patients.

CASE PRESENTATION
A 60-year-old Asian male non-smoker with no significant medical background presented to our accident and emergency (AE) department with significant and worsening shortness of breath. He had been self-isolating with COVID-19 symptoms and was desaturating to SpO2 88% on arrival in AE. He initially required low flows of oxygen (<4 L) to maintain his saturations above 92%; arterial blood gases (ABGs) on 35% oxygen revealed T1RF with pH 7.50, pO2 of 6.8 kP, pCO2 4.2, HCO3 26.6, base excess (BE) 2.5 and lactate 2.2. An initial chest X-ray (figure 1) showed extensive ground-glass changes to mid and lower zones in keeping with COVID-19 infection. The following morning, the patient became more hypoxic and was randomised onto the RECOVERY-LS (respiratory support) trial, which has been designed to compare preintubation ventilation methods; the patient was randomised to usual care arm (low-flow oxygen) before being transferred to our combined COVID-19 high-dependency unit/ intensive care unit area. The patient tested swab-positive for COVID-19 and was randomised onto the RECOVERY trial–dexamethasone 6 mg/day arm. Given the patient’s rising oxygen requirement and the growing evidence that there is a significant burden of pulmonary embolism in patients with COVID-19, CT pulmonary angiography was performed (figure 2), which was negative for pulmonary embolus but did show severe extensive ground-glass change and septal thickening throughout both lungs. A bedside echocardiogram...
was performed to look for evidence of pulmonary hypertension. It showed normal left ventricular size and function. The right ventricle had a normal appearance with good function; importantly, it was not dilated, there was no discernible tricuspid regurgitation and the inferior vena cava was not dilated. We were therefore confident we could exclude pulmonary embolism as a cause of the patient’s clinical deterioration. He remained on prophylactic enoxaparin.

While on the unit, it became clear that the patient’s oxygenation was much improved with prolonged periods of awake proning, generally in excess of 18 hours/day. When supine, there were recurrent desaturations as low as 82%, which we were able to correct to >94% simply by laying the patient in the prone position and not by making any alterations to oxygen delivery. The patient was managed entirely on low-flow oxygen (up to 12 L/min via a non-rebreather mask) for the entirety of his stay in the hospital.

The patient remained conscious and lucid throughout his stay and successfully avoided the need for mechanical intervention as a result of strict proning instructions to which the patient adhered to, with the aim of treating the patient in the prone position for as much as possible, but ideally 18 hours/day. Our unit has a dedicated ‘proning team’ made up of physiotherapists, mainly for proning intubated patients but who are also available to support awake proning through advice and assistance with movement. The patient did not require any sedation during this period. He was stepped down the respiratory ward before being successfully weaned off supplementary oxygen with a resting O₂ saturation of 95% at discharge.

**DISCUSSION**

Proning is a recognised tool for improving gas exchange in mechanically ventilated patients with acute lung injury/acute respiratory distress syndrome and helps to improve ventilation distribution towards non-dependent lung regions and causes a redistribution of lung perfusion.2

Our case study highlights the potential for the use of awake proning in those patients who are not intubated, both as an adjunct to treatment with oxygen therapy and non-invasive ventilation. In a recent pilot of awake proning in patients with COVID-19 at one New York emergency department, the median SpO₂ improved from 84% to 94%.3

Ongoing resource limitation is likely to be a feature of the global healthcare response to the COVID-19 pandemic, and awake proning has the potential to significantly reduce the amount of oxygen required to treat selected patients, even in those with severe parenchymal disease, as demonstrated. In addition to this awake proning may negate the need for mechanical ventilation and level 3 care. With the outcome in mechanically ventilated patients being poor, awake proning may also prove useful in those patients with limitations to their care due to comorbidity.

Once the pandemic has abated, there may be a role for awake proning in patients with other respiratory illness/infection who are proving difficult to oxygenate in the more conventional supine position, though further studies are required to validate it as an effective treatment.

**Learning points**

- Awake proning simply involves treating patients in the prone position and can significantly improve oxygenation in patients with COVID-19 pneumonitis.
- This method may avoid the need for patients to undergo risky and resource-intensive mechanical ventilation.
- Awake proning can form part of an integrated pathway for COVID-19 management to use resources in the most efficient way possible.

**Contributors**  PW: planning of report, conduct of the study, reporting, acquisition of data and analysis; JF: planning of report, conduct of the study, acquisition of data and analysis; LM: planning and conduct of the study; AH: planning and conduct of the study.

**Funding**  The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests**  None declared.

**Patient consent for publication**  Obtained.

**Provenance and peer review**  Not commissioned; externally peer reviewed.

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