

RESEARCH LETTER

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# Effects of prone and lateral positioning alternate in high-flow nasal cannula patients with severe COVID-19

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To date, the COVID-19 pandemic remains widespread globally, placing a heavy burden on healthcare systems around the world. High-flow nasal cannula (HFNC) improves oxygenation and reduces the need for endotracheal intubation in comparison with standard oxygen therapy in patients with severe COVID-19 [1]. During HFNC treatment, the prone position is associated with a significant benefit on oxygenation, but the low compliance of awake patients limits the clinical application of the prone position [2]. The lateral position may also be associated with beneficial effects of gas exchange, especially in unilateral lesions [3]. Although there are studies evaluating the efficacy of both prone and lateral positioning [4, 5], comparative studies on the efficacy of prone and lateral positions in HFNC patients with severe COVID-19 are rarely reported.

In this single-center prospective study, a total of 10 severe COVID-19 patients were included in the treatment center for severe COVID-19 patients in Heilongjiang Province of China. The severe COVID-19 patients in our study were those admitted to the ICU with  $\text{PaO}_2/\text{FiO}_2 \leq 300$  mmHg. Patients in supine position (0.5 h), left lateral position (1.5 h), supine position (0.5 h), right

lateral position (1.5 h), supine position (0.5 h), and prone position (1.5 h) treatment sequence. Blood oxygen saturation and respiratory rate were observed at each time point, and blood gas analysis was performed. (Fig. 1).

SAS v9.4 software was used for statistical analysis. Normally distributed quantitative data are described by the mean  $\pm$  standard deviation ( $x \pm s$ ). The *P* values of pairwise comparisons were corrected by the Bonferroni method. The results showed that  $\text{PaO}_2/\text{FiO}_2$  and  $\text{PaO}_2$  improved in the left lateral, right lateral and prone positions compared with the supine position. There was no significant difference between the left and right lateral positions, and it was independent of dominant side decubitus, but the improvement degree of  $\text{PaO}_2/\text{FiO}_2$  and  $\text{PaO}_2$  was less than that of the prone position. There was no significant difference in oxygen saturation or respiration rate among different decubitus positions.

In conclusion, in HFNC patients with severe COVID-19, alternating left and right lateral positions improved oxygenation function. When the prone position is not tolerated for long periods of time, prone and lateral position alternating can be used to improve oxygenation.

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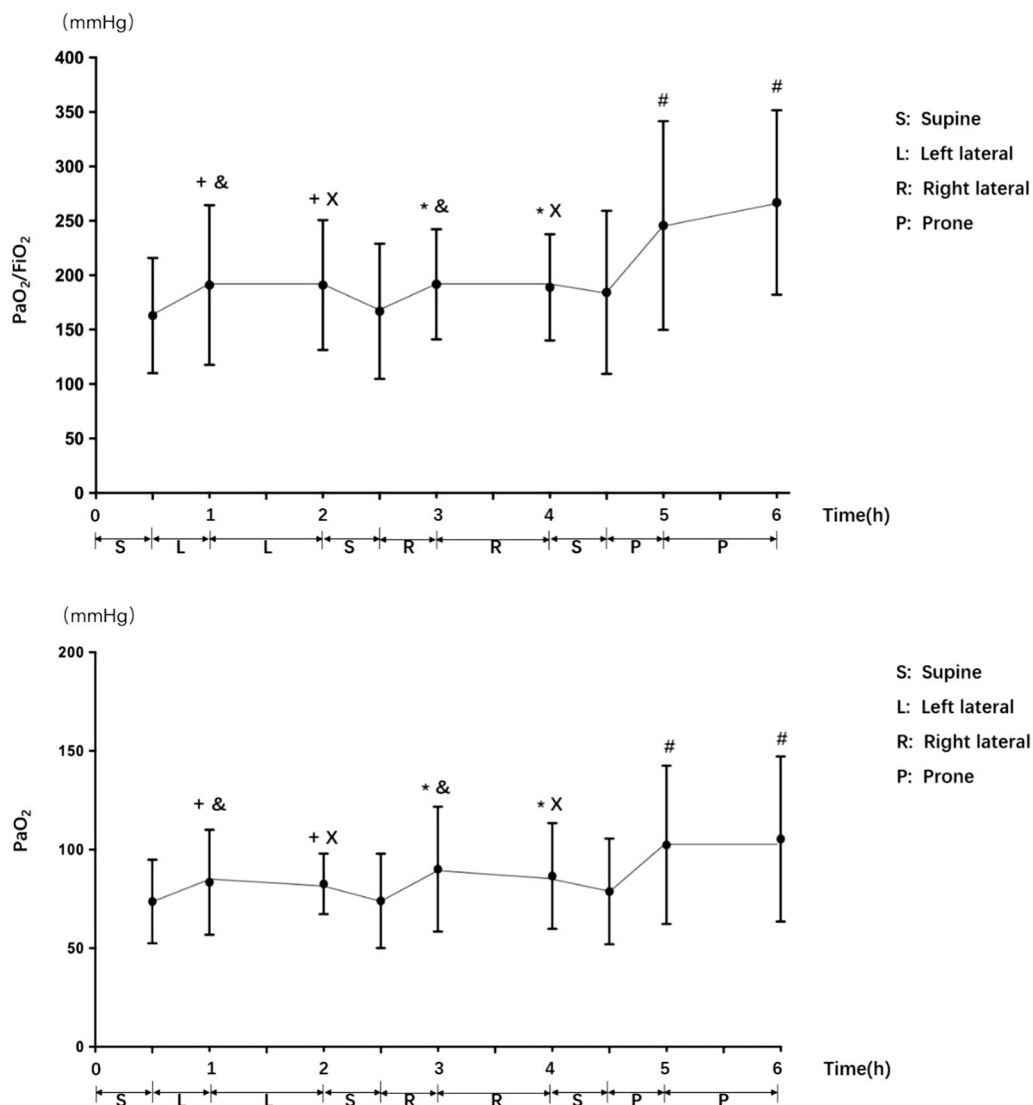
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**Fig. 1** PaO<sub>2</sub>/FiO<sub>2</sub> and PaO<sub>2</sub> improved in left lateral, right lateral, and prone position compared with supine position (<sup>†</sup>*P* < 0.05 vs supine 0.5 h, <sup>\*</sup>*P* < 0.05 vs supine 2.5 h, <sup>#</sup>*P* < 0.05 vs supine 4.5), and the improvement degree of PaO<sub>2</sub>/FiO<sub>2</sub> and PaO<sub>2</sub> in left and right lateral position was less than that of prone position (<sup>&</sup>*P* < 0.05 vs supine prone 5 h, <sup>x</sup>*P* < 0.05 vs supine prone 6h)

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**Authors' contributions**

YC, CN, MZ, KY, and CW conceived and designed the study. YC and CW collected and analyzed the data. CN and CW wrote the manuscript. WM polished the manuscript. MZ, KY, and CW reviewed and revised the manuscript. All authors read and approved the final manuscript.

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**Availability of data and materials**

The datasets used and analyzed during the current study are available from the corresponding authors on reasonable request.

**Declarations**

**Ethics approval and consent to participate**

The study was approved by the Ethics Committee of the First Affiliated Hospital of Harbin Medical University, code number kyk2020003.

**Consent for publication**

Not applicable.

**Competing interests**

The authors declare that they have no competing interests.

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