

LETTER



Efficacy of early prone position for COVID-19 patients with severe hypoxia: a single-center prospective cohort study

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Dear Editor,

With the global epidemic of COVID-19, as of July 8, 2020, 12,025,348 people have been infected with 4.56% mortality [1]. Many COVID-19 patients died due to severe hypoxia [2, 3]. It is particularly important to find a simple and effective way for COVID-19 patients' treatment. Recent studies reported that prone position was used to treat non-intubated COVID-19 patients and hypoxemic acute respiratory failure [4, 5]. However, the number of patients was small, the follow-up was short, clinical outcomes were not assessed in their study. In this study, we aimed to explore whether the early prone position can effectively improve severe hypoxia, CT imaging performance and survival prognosis of COVID-19 patients with severe hypoxia.

A total of 60 COVID-19 patients with severe hypoxia were enrolled from February 1, 2020 to April 30, 2020 (Fig. S1, Tables S1 and S2) (Chinese Clinical Trial Registry: ChiCTR2000033053). And 23 patients were taken early prone position and 37 patients were not. In prone

position group, the pulse oxygen saturation (SpO_2) increased from $91.09 \pm 1.54\%$ to $95.30 \pm 1.72\%$ ($P < 0.01$) after 10 min, $95.48 \pm 1.73\%$ after 30 min ($P < 0.01$), but no significant difference after 30 min compared with 10 min ($P = 0.58$) (Fig. 1a). The respiratory rate (RR) decreased from 28.22 ± 3.06 times/min to 27.78 ± 2.75 times/min after 10 min ($P = 0.20$), 24.87 ± 1.84 times/min after 30 min ($P < 0.01$), but no significant difference after 10 min compared with the baseline value ($P = 0.203$) (Fig. 1b). ROX index increased from 3.35 ± 0.46 after 10 min to 3.55 ± 0.47 ($P < 0.01$), 3.96 ± 0.45 after 30 min ($P < 0.01$) (Fig. 1c). However, there was no significant difference in SpO_2 , RR and ROX index in a non-prone position group (Fig. 1d–i). Additionally, there is significant difference in SpO_2 -10 min, ROX-10 min, SpO_2 -30 min, RR-30 min and ROX index-30 min between the two groups ($P < 0.01$) (Table S3). Furthermore, the early prone position can also improve the CT imaging performance in some patients (Fig. 1j). After 90 days of follow-up, 10 (43.5%) COVID-19 patients died in the prone position group, compared with 28 (75.7%) COVID-19 patients in the non-prone position group (Fig. 1k). As for the potential mechanism of early prone position improving the hypoxia, we speculate that it may be caused by redistribution of blood flow and edema fluid redistributes to the ventral side with gravity and the atrophic alveolar are reopened in the prone position, which cause V/Q improvement.

There are also some limitations in our study: (1) Limited to the conditions at that time, some COVID-19 patients with severe hypoxia between two groups cannot be managed by the same researcher. (2) Limited to COVID-19 outbreak, blood gas determining respiratory

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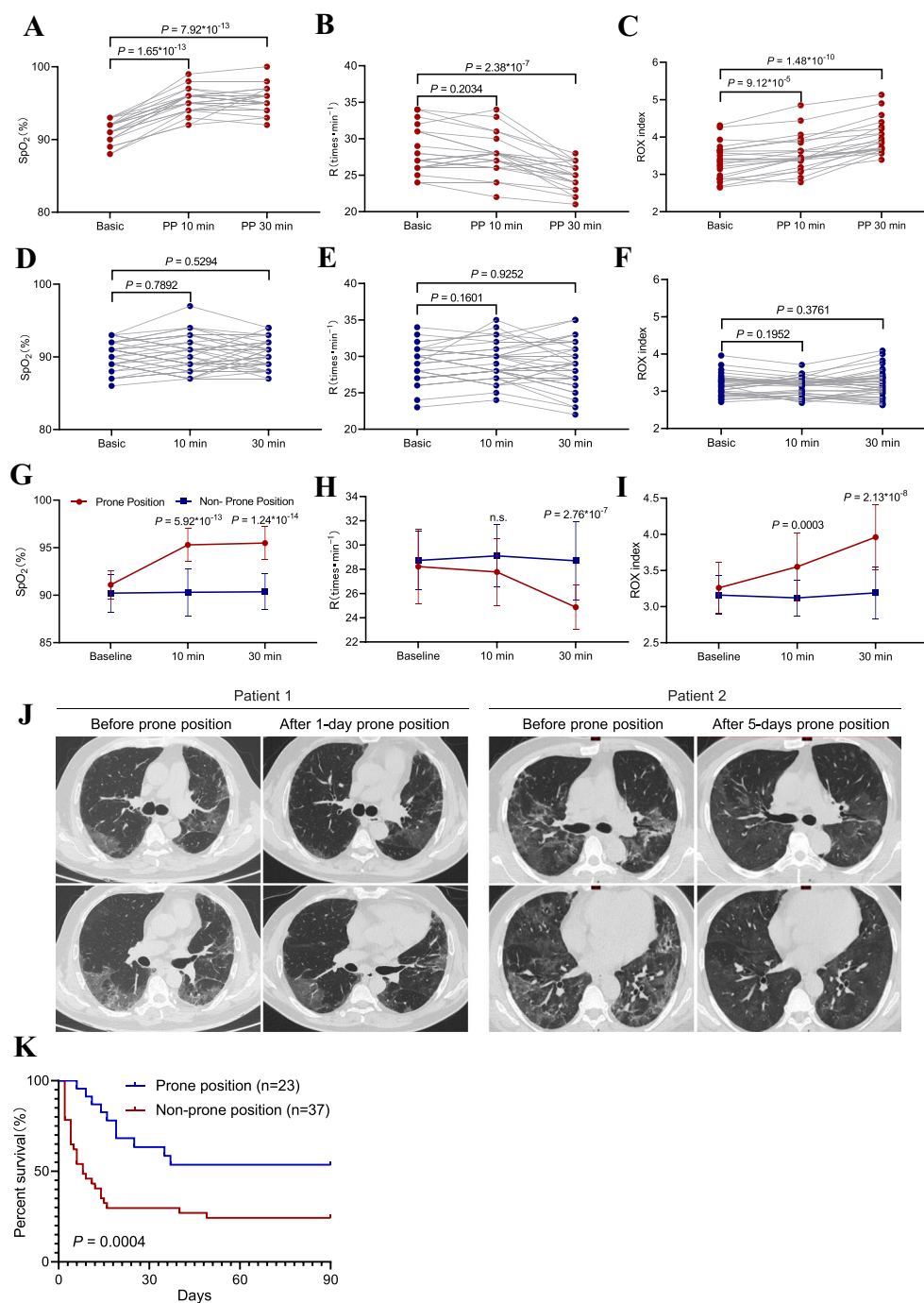


Fig. 1 Early prone position significantly improves SpO₂, RR, ROX index, CT imaging performance and reduce the mortality of COVID-19 patients with severe hypoxia. **a–c** The single SpO₂ (**a**), RR (**b**), and ROX index (**c**) change in the prone position group. **d–f** The single SpO₂ (**d**), RR (**e**), and ROX index (**f**) change in the non-prone position group. **g–i** The average SpO₂ (**g**), average RR (**h**), and average ROX index (**i**) change between prone position and non-prone position groups. **j** In patient 1, CT imaging showed that the density and scope of diffuse patch shadow in both lungs was significantly improved after 1-day prone position. In patient 2, CT imaging showed that the patch shadow was completely absorbed after 5-day prone position. **k** Survival curve of COVID-19 patients with severe hypoxia between prone position group and non-prone position group

failure cannot be analyzed in time. (3) The number of COVID-19 patients with severe hypoxia enrolled in this study is also limited.

In conclusion, this work will have value in helping clinicians to use early prone position to treat COVID-19 patients with severe hypoxia, it may reduce the mortality of COVID-19 patients with severe hypoxia, and help guide appropriate and effective management for future patients.

Electronic supplementary material

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Compliance with ethical standards

Conflicts of interest

The authors have no conflicts of interest to disclose.

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