



Correspondence

Prone positioning and high-flow oxygen improved respiratory function in a 25-week pregnant woman with COVID-19



Dear Editor, we found that prone positioning (PP) without sedation or invasive ventilation was efficient to manage COVID-19 infection in a 25-week pregnant woman.

This 21-year-old Caucasian multipara (G7P5) without known comorbidities presented to the obstetrics department in her 23rd week of gestation and seven days after the onset of COVID-19 symptoms. On admission, the patient had fever and normal respiratory parameters while breathing ambient air. Testing for SARS-CoV-2 on nasopharyngeal swab was negative but computed tomography (CT) found typical COVID-19 lesions representing 20–30 % of the lung surface.

On day 10, the patient was drowsy, and her SatO₂ dropped; administration of high-flow nasal oxygen (HFNO) at 30 L per minute (fraction of inspired oxygen 100 %) and alternating with standard oxygen at 5 L per minute was started. On day 11, the patient's respiratory state worsened, and her SatO₂ was at 94 % over 5 L of oxygen per minute. Clinical evaluation revealed tachypnea and tachycardia. Blood gas analysis results remained reassuring without acidosis. The patient was transferred to the ICU for surveillance.

The patient's respiratory state improved by positional therapy that alternated PP with lateralization. Oxygen saturation increased while the HFNO parameters remained stable and there was also improvement of the blood gas parameters (Table 1).

During days 12–15 after the onset of first symptoms, the patient's hemodynamic situation remained stable without catecholamine support. During fever peaks, her respiratory state deteriorated, but blood gas samples were normal with alternate administration of HFNO and non-invasive ventilation (NIV) with a

decreasing concentration of dioxygen. The patient was lateralized for 2 -h periods during the day and was weaned off NIV in the morning and HFNO in the evening of day 15. Fetal monitoring 3 times a day provided reassuring results.

On day 16, the patient returned to the obstetrics department and the still-pregnant woman was discharged 8 days later.

Severe COVID-19 can lead to acute respiratory distress syndrome (ARDS), and pregnant women are not spared [1]. This case shows that continuation of HFNO with alternating PP and lateralization can improve respiratory function and, just as importantly, prolong pregnancy to avoid extreme prematurity.

The PP is known to improve blood oxygenation and mortality in severe acute respiratory failure [2], and it is being used in the management of COVID-19 [3]. However, little is known about PP in pregnant women. In 2014, Samanta et al. [4] described a case of severe H1N1-related ARDS at 33 weeks of pregnancy. Despite orotracheal intubation, the respiratory state of the patient worsened, and ventilation in PP enabled satisfactory oxygenation to save the patient and continue the pregnancy. Claudia Oliveira et al. [5] outline the patient comfort advantages of PP in the respiratory function of pregnant women compared to supine and Fowler's positions using special stretchers. The World Health Organization [3] have concluded that there is little evidence regarding PP in pregnant women. They may benefit from being placed in lateral positions to manage COVID-19 respiratory infection. Due to a lack of comfort, we experienced problems in maintaining our patient in PP for more than 2 h, and lateralization or adapted stretchers could be an interesting compromise.

To our knowledge, this is the first description of a pregnant woman with COVID-19 whose condition and pregnancy were managed effectively by PP without sedation or invasive ventilation. The patient was able to return home still pregnant 24 days after the onset of the disease. Combining PP with HFNO could be a useful treatment strategy for avoiding intubation in pregnant women, but

Table 1

Hemodynamic and arterial blood gas parameters before, during, and after prone positioning (PP): H = hours.

Variables	PRE-PP (H-1)	DURING PP	LATERAL - RIGHT (H + 2)	LATERAL - LEFT (H + 4)	POST-PP (H + 7)
Heart rate (beats per minute)	114	136	105	121	123
Respiratory rate (breaths per minute)	30	29	21	28	23
Systolic arterial pressure (mmHg)	156	129	93	139	88
Diastolic arterial pressure (mmHg)	59	52	40	55	42
Body Temperature (°C)	38.8	39.7	38.5	38.5	37.3
SpO ₂ (%)	89	96	95	97	98
pH	7.48	7.48	–	–	7.41
PaCO ₂ (mmHg)	32.1	36.2	–	–	38.5
PaO ₂ (mmHg)	85	112	–	–	146
Base excess (mmol/L)	1.1	0.3	–	–	0.1
Lactates (mmol/L)	1.10	0.97	–	–	0.65
HNFO flow	60	60	60	60	60
HNFO FiO ₂	60	60	60	70	70

further studies are needed to validate our approach, particularly for treating acute respiratory failure in this specific population.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] Yan J, Guo J, Fan C, Juan J, Yu X, Li J, et al. Coronavirus disease 2019 (COVID-19) in pregnant women: a report based on 116 cases. *Am J Obstet Gynecol* 2020 in press.
- [2] Guérin C, Reignier J, Richard J-C, Beuret P, Gacouin A, Boulain T, et al. Prone positioning in severe acute respiratory distress syndrome. *N Engl J Med* 2013;368(23):2159–68.
- [3] Clinical management of severe acute respiratory infection when COVID-19 is suspected. Geneva: World Health Organization ([https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected)).
- [4] Samanta S, Samanta S, Wig J, Baronia AK. How safe is the prone position in acute respiratory distress syndrome at late pregnancy? *Am J Emerg Med* 2014;32(6) 687 e1-3.
- [5] Oliveira C, Lopes MAB, Rodrigues AS, Zugaib M, Francisco RPV. Influence of the prone position on a stretcher for pregnant women on maternal and fetal hemodynamic parameters and comfort in pregnancy. *Clinics (Sao Paulo)* 2017;72(6):325–32.

Florence Vibert*
Mathilda Kretz
Vincent Thuet
Florian Barthel
Fanny De Marcillac
Philippe Deruelle
Lise Lecointre
*Hôpitaux universitaires de Strasbourg, 1 rue Molière, 67 200
Strasbourg, France*

* Corresponding author.

E-mail addresses: florence.vibert@chru-strasbourg.fr (F. Vibert*),
mathilda.kretz@chru-strasbourg.fr (M. Kretz),
vincent.thuet@chru-strasbourg.fr (V. Thuet),
florian.barthel@chru-strasbourg.fr (F. Barthel),
fanny.demarcillac@chru-strasbourg.fr (F. De Marcillac),
philippe.deruelle@chru-strasbourg.fr (P. Deruelle),
lise.lecointre@chru-strasbourg.fr (L. Lecointre).

Received 8 May 2020