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Rodin's Thinker: An Alternative Position in Awake Patients with COVID-19

To the Editor:

Prone positioning is indicated in invasively ventilated patients with acute respiratory distress syndrome and coronavirus disease (COVID-19) (1, 2). It improves $\dot{V}/\dot{Q}$ matching and oxygenation while allowing for greater lung protection (3)

Because of the high influx of patients, heavily burdening ICU capacities during the COVID-19 pandemic, clinicians worldwide have sought strategies to avoid invasive ventilation. The use of prone positioning in awake, nonintubated, spontaneously breathing patients (possibly combined with noninvasive respiratory support) has been investigated by several groups. Awake prone positioning is a feasible strategy and is well tolerated by most patients, with a clear benefit to oxygenation, although the effect on outcome is still unclear (4–6).

However, a significant number of patients, ranging between 8.9% and 63.3%, are unable to tolerate this position (4–6). Moreover, a recent study investigating the use of a patient-directed prone positioning protocol was stopped early owing to poor protocol adherence (7).

In a context characterized by a lack of resources, we therefore sought an alternative strategy that would retain the pathophysiological benefits of prone positioning in awake patients while being more tolerable. We began to invite patients to lie chest forward on a flat surface while sitting (Figure 1). This position is reminiscent of the famous sculpture "The Thinker" by Auguste Rodin (1840–1917) (Figure 1A), and we therefore named it "Rodin's position," although it is better known as "tripod position" (8).

Originally Published in Press as DOI: 10.1164/rccm.202104-0915LE on July 9, 2021

Methods

Patient population. We retrospectively reviewed the records of patients admitted to respiratory high-dependency units at San Gerardo Hospital (Monza, MB, Italy) between November 1, 2020, and January 15, 2021, during the second COVID-19 wave. The local protocol was to place all patients with COVID-19 acute respiratory distress syndrome in Rodin's position for at least 3 hours daily. Data were collected in a local online registry as part of the STORM study (Spallanzani Institute approval number 84/2020; NCT04424992), which did not include the present evaluation as a prespecified endpoint. Patients' consent was waived. Patients were enrolled if they were receiving noninvasive respiratory support and had undergone at least 3 hours in Rodin's position. Lack of a complete set of arterial blood gases within a specified time range (*see* what follows) was the only exclusion criterion.

Study protocol. Patients were invited to sit on a chair and rest their chest on a flat, elevated surface (i.e., their bed or a desk, at intermammillary line), thus placing the chest in a "semiprone" position (Figures 1B and 1C). The head was laid on the arms, elevated and crossed. Respiratory support variables (interface, $F_{I_{O_2}}$, and positive end-expiratory pressure [PEEP]) were left unchanged between the different time points.

We collected data on patient age; medical history C-reactive protein; platelet count; D-dimer; ventilation interface and parameters ($F_{I_{O_2}}$ and PEEP); arterial blood gas and respiratory rate in semisupine position before Rodin's position ($supine_{PRE}$), while in Rodin's position, and in semisupine position after Rodin's position ($supine_{POST}$); incidence of intubation; and death. Data were considered only in a window of 3 hours before $supine_{PRE}$ and after $supine_{POST}$.

Statistical analysis. Data are described as number (percentage) for categorical variables and as mean ± SD or median (interquartile range) for continuous variables, depending on their distribution. Normality was assessed using the Shapiro-Wilk test. A one-way ANOVA for repeated measures was performed to compare arterial blood gas values and respiratory rates at the three different time points.

Results

During the study period, 147 patients were admitted to the respiratory high-dependency units at San Gerardo Hospital. Of these, 37 patients did not undergo Rodin's position—it was not indicated by clinicians for 34 patients (26 patients too mild, 4 bleeding risk, and 4 admitted for palliation), and it was not tolerated by 3 patients (2 had psychiatric disorders, and 1 had dementia). A total of 110 patients underwent at least one cycle of Rodin's position; 85 were excluded from the study (no arterial blood gas at all specified time points), and a total of 25 patients were included in the present analysis.

Most patients were male, aged 65.0 ± 8.6 years; about half (44%) had hypertension, 12% had diabetes, and 12.0% had a malignancy. All patients were receiving continuous positive airway pressure by helmet, with an $F_{I_{O_2}}$ of 60 (50–77.5), a PEEP of 10 cm H_2O (8–10), and a baseline $Pa_{O_2}/F_{I_{O_2}}$ of 146.2 ± 62.7 mm Hg. Rodin's position was initiated 4.2 ± 3.4 days after hospitalization, and patients underwent 5.4 ± 3.4 cycles. No clinically relevant side effects were reported. Of these 25 patients, 18 also underwent cycle(s) of prone position (in 9 cases before the first Rodin cycle), but not during the $supine_{PRE}$-to-

Figure 1. Named after the famous (*A*) "The Thinker" (Le Penseur) statue by Auguste Rodin (1840–1917). To assume Rodin's position, patients are asked to lie forward with their chest on a flat surface (bed or table) while sitting. The position can be assumed (*B*) when breathing through standard-oxygen, high-flow nasal cannulas or (*C*) helmet.

Table 1. Arterial Blood Gas Values and Respiratory Rates before, during, and after Rodin's Position

	Baseline Supine ($Supine_{PRE}$)	In Rodin's Position (Rodin)	After Resuming Supine Position ($Supine_{POST}$)	*P* ($Supine_{PRE}$ vs. Rodin)	Difference ($Supine_{PRE}$ vs. Rodin)	*P* ($Supine_{PRE}$ vs. $Supine_{POST}$)	Difference ($Supine_{PRE}$ vs. $Supine_{POST}$)
FI_{O_2}, %	60 (50.0–77.5)	60 (50.0–77.5)	60 (50.0–77.5)	—	—	—	—
PEEP, cm H_2O	10 (8–10)	10 (8–10)	10 (8–10)	—	—	—	—
Arterial blood gas							
pH	7.45 ± 0.03	7.45 ± 0.04	7.45 ± 0.04	0.71	0.0 ± 0.02	0.44	0.0 ± 0.03
Pa_{O_2}, mm Hg	86.9 ± 26.3	185.2 ± 81.6	130.0 ± 63.4	<0.001	98.2 ± 81.6	0.003	43.1 ± 64.2
Pa_{CO_2}, mm Hg	35.1 ± 4.6	35.1 ± 4.6	36.0 ± 3.8	0.96	−0.04 ± 3.7	0.31	0.9 ± 4.3
Respiratory rate, breaths/min	24.7 ± 5.6	23.2 ± 4.0	22.5 ± 3.8	0.96	−1.9 ± 4.1	0.15	−2.2 ± 5.2
Platelets, $10^3/\mu l$	266.0 (208.0–345.0)	—	—	—	—	—	—
C-reactive protein, mg/L	8.1 ± 6.4	—	—	—	—	—	—
D-dimer, ng/ml	411.0 (313.5–862.25)	—	—	—	—	—	—

Definition of abbreviation: PEEP = positive end-expiratory pressure.
Data are presented as mean ± SD or median (interquartile range).

$supine_{POST}$ interval. All patients received systemic corticosteroids during their ICU stay.

Arterial blood gas values and respiratory rates at the three study time points are reported in Table 1: Pa_{O_2} increased significantly while in Rodin's position and remained significantly higher than baseline once the supine position was resumed. No significant difference was observed in Pa_{CO_2}, pH, and respiratory rate (Table 1).

Seven patients (28%) underwent endotracheal intubation, and one died.

Discussion

After a case report (9), this is—to our knowledge—the first systematic description of the use of a position alternative to prone in awake patients with COVID-19. We showed that Rodin's position might contribute to oxygenation improvements and with effects lasting after the semisupine position is resumed, without affecting other arterial blood gas parameters and respiratory rate. Arterial blood gases were collected in a relatively narrow timeframe—with unchanged FI_{O_2} and PEEP—and patients were enrolled after a few days from hospital admission, but we cannot rule out that oxygenation improvement was due to the natural course of the disease or other treatments.

As mentioned, the use of awake prone positioning has been investigated by several authors during the COVID-19 pandemic. Although clear evidence of its impact on outcome is missing, prone positioning is extensively used worldwide, with several trials ongoing.

Rodin's position was associated with an oxygenation improvement of a magnitude similar to that reported for prone positioning (6) and is tolerated also by patients who are unable to undergo prone positioning. Moreover, it requires less workload from personnel during a patient's positioning. Our results suggest that Rodin's position improves arterial oxygenation (a benefit retained after the position is interrupted) but does not decrease ventilatory drive. We did not investigate the mechanism of this oxygenation improvement: similarly to prone position, Rodin's position reverses the gravitational gradient. In addition, Rodin's position is characterized by a more orthostatic position (similar to what is achieved by upright prone positioning) (10), which decreases abdominal compression on the diaphragm, increasing end-expiratory lung volume, but also impacts hemodynamics by decreasing preload.

This report suffers from some limitations, in that it is retrospective and single center.

In conclusion, we show that Rodin's position is feasible, that it is safe, and that it might improve oxygenation in COVID-19, making it an alternative or adjunct to awake prone positioning to maintain safe oxygenation. Further studies are needed to assess whether it has any impact on patient-centered outcomes, in comparison with routine care or prone positioning. ■

Author disclosures are available with the text of this letter at www.atsjournals.org.

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