

EDITORIAL



# Prone position in ARDS: a simple maneuver still underused

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A recent international multicenter prospective study enrolling 29,144 patients who received invasive or non-invasive ventilation reported that acute respiratory distress syndrome (ARDS) was present in 23% of the mechanically ventilated patients [1]. In recent years, the ARDS mortality rate ranged between 28% and 35% [1, 2] with lower survival in patients with more severe ARDS [1]. The main supportive therapy in ARDS is invasive mechanical ventilation combining lung protective ventilation to prevent ventilator-associated lung injury with a restrictive fluid therapy to limit/prevent lung edema [3, 4]. However, the optimal approach for lung protective ventilation is still questionable [5]. The recent American/European guideline and an expert opinion on respiratory support in ARDS patients recommended a low tidal volume ventilation (i.e., 6 ml/kg of ideal body weight, or lower in case of plateau pressure higher than 30 cm H<sub>2</sub>O) with positive end-expiratory pressure (PEEP) adjusted according to the respiratory mechanics (lung and chest wall elastance), driving pressure, gas exchange, and lung imaging [6, 7]. In addition, in case of severe ARDS the use of prone position, according to previous positive studies [8–10], has been recommended. However, the use of prone position in daily clinical practice in ARDS ranges between 7% and 8% of the mechanically ventilated patients [1, 2]. In the current issue of *Intensive Care Medicine*, Guerin et al. reports the results of a prospective observational international study (APRONET study) evaluating the prevalence of the application of prone position in ARDS patients, the reasons for not applying it, and the related complications [11]. This 1-day prevalence study was repeated four times between April

2016 and January 2017. Intubated/tracheostomized ARDS patients, according to the Berlin definition, were screened. Up to 141 intensive care units (ICUs) from 20 countries participated, with 735 enrolled ARDS patients, reporting an ARDS prevalence between 8.9% and 13.3%. At least one proning session was completed in 13.7% of the patients; the rate of proning significantly differed among mild, moderate, and severe ARDS patients (5.9%, 10.3%, and 32.9%, respectively). The main reasons for not proning were the absence of severe hypoxemia according to clinical judgment (64%), a mean arterial pressure lower than 65 mmHg (5.7%), and end of life decision (4.2%). Complications of the prone position session were observed in 11.9% of prone patients, mainly related to hypoxemia and the endotracheal tube.

Despite the possible selection bias of ICUs, as most of them were located in European countries (Spain, French, Italy) where the use of prone position is higher compared to non-European countries, a clinically, although not statistically, relevant increase in the rate of proning ARDS patients was found compared to previous studies [2, 9]. More importantly, the highest increase was found in patients with severe ARDS (PaO<sub>2</sub>/FiO<sub>2</sub> lower than 100) which accounts for the worse outcome, but in whom the prone position significantly improves the survival. The reason for this increase in the use of prone position was mainly due to the positive randomized controlled studies recently published [8–10]. However, compared to the possible “theoretical” application in all the moderate/severe and severe ARDS patients [6, 7], currently the prone position is applied in only between 16% and 33% of the patients presenting the criteria. On the contrary, despite the quality of the current evidence being low and the lack of a definitive conclusion on the outcome [12], the recruitment maneuvers are applied in 32% of severe ARDS patients [1]. A similar rate of application was found for neuromuscular block in severe ARDS [1].

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What could be the possible reasons for not broadly proning ARDS patients in ICUs, while outside intensive care, such as in the operating room, the prone position is routinely used when indicated? Possible explanations could be the feelings of the physicians that prone position could induce negative side effects such as the risk of artificial airway displacement, the high number of physicians and nurses required for the maneuver, with a consequent increase in workload, the difficulty to manage secretions, enteral nutrition, and the low number of ARDS cases in small volume intensive care.

However, in the present study the authors found that evaluation of the level of hypoxemia as not severe enough and hemodynamic instability were the main reasons for not proning patients. Although the simple cutoff value of a low oxygenation ( $\text{PaO}_2/\text{FiO}_2$  lower than 100 or 150) with a minimum PEEP level of 10  $\text{cmH}_2\text{O}$  could be reasonable to apply or not apply the prone position in the early phase, hemodynamic impairment is not a contraindication. On the contrary, by recruiting the dorsal regions (dependent lung), improving the gas exchange, even if with an unpredictable magnitude [13, 14], and increasing the intra-abdominal pressure, the prone position might reduce the right ventricular afterload, reduce the pulmonary arterial pressure, and increase the cardiac output [15]. Interestingly, in the PROSEVA trial a significantly lower amount of cardiac arrest occurred in the prone compared to the supine group [9]. Last but not least is the issue of safety of the prone position in ARDS patients. The previous studies reported a rate of severe complications directly attributable to the turning procedures, such as extubation, kinking of the endotracheal tube, or dislodging of the Swan-Ganz catheter, of between 8% and 12%. Compared to the previous data, the present study showed a rate of severe complications of the prone position session of lower than 5%.

Although the rate of application of the prone position has been increasing throughout the years with a low rate of complications, in clinical practice it is still considered as a rescue maneuver. On the contrary, it should be considered in all moderate/severe ARDS patients—irrespective of the level of hypoxemia—to attenuate ventilator-induced lung injury and improve hemodynamics.

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