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EDITORIAL

Less is not always more

Cuanto menos no es más para todos



This issue of *Medicina Intensiva* publishes a retrospective study of 382 patients with ARDS that compares the patients' clinical progression based on their tidal volumes (TV) used in 3 groups: low TV (mean, 6.7 mL/kg), intermediate TV (mean, 8.9 mL/kg), and high TV (mean, 11.2 mL/kg). After confirming that all 3 groups had the same baseline characteristics, we can conclude that the group of patients with intermediate TVs had similar 28-and-90-day mortality rates compared to the group of patients with low TVs. However, high TVs were associated with higher mortality rates. In this study conducted before the COVID-19 pandemic, 5 Taiwanese ICUs participated for a total of 130 beds¹.

This study reveals that, despite recommendations of using low TVs for the management of ARDS, compliance to this recommendation is still low. In this cohort, up to 80% of the patients received TVs > 6 mL/kg. The same thing has been reported during the recent COVID-19 pandemic waves. In the Spanish ICU registry published by Ferrando et al.², the mean TV was 6.9 mL/kg.

The study confirms that, in the management of ARDS, intermediate TVs are still uncharted territory and that in patients with better lung mechanics, TVs > 6 mL/kg could be used. The concept set forth in the guidelines on "the fewer, the better" is put into question here³. Since the publication of a clinical trial⁴ back in 2000 that proved that high TVs (12 mL/kg) with high plateau pressures to treat ARDS were associated with longer durations of MV and higher mortality rates compared to TVs of 6 mL/kg, the guidelines now universally recommend the use of low TVs. However, when intermediate TVs have been compared to standard TVs of 6 mL/kg the superiority of low TVs in patients with and without ARDS has not been confirmed⁵.

Some authors say that TVs should be adjusted to lung mechanics and lung recruitment. Xie et al. analyzed the deleterious effect of an increased TV in patients with ARDS with different lung compliances. They concluded that lung

lesions induced by high TVs were more common in patients with worse lung mechanics, as opposed to those with relatively good lung compliance. They saw that strain or elasticity (understood as lung tissue mechanics) was much more affected when TV was higher in patients with poor mechanics⁶. In the review conducted by Gattinoni et al. on ARDS, the concept that the pressure generated by the ventilator acts directly at pulmonary level (transpulmonary pressure) is based on 2 different factors: the correlation between lung elasticity and the overall elasticity of the respiratory system, and the size of the lungs⁷. With more ARDS severity, more collapsed lung parenchyma (baby lung) and, consequently, less useful lungs. It is in these patients with "small lungs" in whom high TVs can be detrimental, not as much in patients with better lung mechanics (with a higher percentage of non-collapsed lung). In the management of ARDS, ventilation poses a difficult balance between collapse and overdistension.

The main problems of low TVs are lung collapse and hypercapnia. Therefore, arterial blood gas tests should be used in the routine clinical practice and at the patient's bedside to adjust the ventilator parameters. In the case of hypercapnia, if RF has already been adjusted to the maximum and plateau pressures allow it, TV is often increased >6 mL/kg. Patients in whom an increased TV does not increase the plateau pressure dangerously are those with better lung mechanics. As a matter of fact, it is another one of the results from the study published in this issue, both oxygenation (measured using the PaO₂/FiO₂ ratio) and lung elasticity (measured with lung compliance) were better in the group of patients in whom higher TVs were used. However, in the group of patients in whom higher TVs were used, PEEP was lower because plateau pressure was kept at bay and possibly because there was less recruitable lung parenchyma.

Although it is not main endpoint of this study, the use of the prone position was rare (2%–20%), despite almost all patients met the criteria for the prone position. It was precisely the prone position that achieved better lung recruitment and lung mechanics, and less difference between ventral and dorsal transpulmonary pressures, thus

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allowing greater airing of both the dorsal and the lumbar alveoli; in conclusion, minimizing dead space would spare the use of higher TVs. On the contrary, the use of neuromuscular blockers was high. Guidelines still recommend them within the first 48 h. However, only 1 study has demonstrated their effectiveness⁸. The last pandemic of COVID-19-induced ARDS has taught us a lot on the management of patients with ARDS. Compliance to the prone position has increased parallel to the use of muscle relaxants².

Another outcome that should be interpreted with caution is the higher mortality rate reported in the group of patients in whom low TVs were used. We should not conclude this was due to low TV *per se*, but to the fact that they were patients with more severe ARDS in whom elevated TVs could not be used due to the presence of high pressures despite having similar APACHE II scores at admission. In fact, the multivariate analysis of mortality did not establish any correlations between low TVs and mortality rate.

Therefore, we wish to encourage the critical reading of the study. Please interpret the results with caution and be aware of the study limitations. Studies like this help us keep asking questions in the search for the answers we need. Sometimes, at the patient's bedside, the recommendations are just recommendations. But they need to be adapted to every single patient we are dealing with.

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