



## Editorial

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# Permissive hypercarbia and managing arterial oxygenation during one-lung ventilation

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One-lung ventilation (OLV) is the gold standard for several thoracic surgeries, such as lung, esophageal, aortic, or mediastinal procedures [1]. With OLV, access to the surgical field could be improved, and the process of operation could also be expedited. During OLV, only one lung is ventilated, and both lungs are perfused; therefore, transpulmonary shunting and impairment of oxygenation inevitably occurs. This occasionally results in hypoxemia, and maintenance of adequate arterial oxygenation is a challenge for both anesthesiologists and surgeons.

Hypoxemia during OLV could be treated with either reinflation of the operated lung or increasing the inspiratory oxygen fraction of the ventilated lung. The alternative or supplemental approaches are either intermittent positive airway pressure [2] or differential lung ventilation [3] to the ventilated lung.

There are some reports about permissive hypercarbia during OLV in patients who have undergone thoracotomy. Permissive hypercarbia is defined as the acceptance of hypercarbia and continuation of the ventilation strategy, and permissive hypercarbia is usually achieved by slowly lowering the tidal volume and/or the respiratory rate. Sticher et al. [4] reported that cardiac index and pulmonary vascular resistance were increased, systemic vascular resistance decreased, and oxygenation remained unchanged with hypercarbic hypoventilation during OLV. In that study, minute ventilation was reduced from  $8.8 \pm 1.7$  L/min to  $4.2 \pm 0.70$  L/min, and arterial  $\text{PaCO}_2$  increased from  $41.3 \pm 3.0$  mmHg to  $63.8 \pm 7.5$  mmHg.

In the current issue of the *Korean Journal of Anesthesiology*, Lee et al. [5] reported the relationship between hypercarbia and arterial oxygenation compared to normocarbia during OLV. In this report, the ventilatory rate was adjusted to maintain the preset target  $\text{PaCO}_2$  (normocarbia,  $\text{PaCO}_2$ : 38–42 mmHg, hypercarbia,  $\text{PaCO}_2$ : 45–50 mmHg). The authors concluded that hypercarbia increased  $\text{PaO}_2$  and  $\text{O}_2$  carrying capacity and improved pulmonary mechanics without significant hemodynamic changes during OLV, and it may help manage hypoxemia during OLV. Therefore, permissive hypercarbia may be a simple and valuable modality for managing arterial oxygenation during OLV. In this study, permissive hypercarbia is considered as one of the treatment modes for hypoxemia during OLV, and the results support the theoretical basis for including permissive hypercarbia to manage hypoxemia during OLV.

More rigorously designed multicenter randomized clinical trials and large-scale observational studies are required to determine the effectiveness of permissive hypercarbia in managing arterial oxygenation during OLV.

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## Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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