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Global Optimal PEEP for Anesthetized Patients

Ata Mahmoodpoor,[1] and Samad EJ Golzari[2,*]

[1]Department of Anesthesiology and Intensive Care Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
[2]Research Center for Evidence Based Medcine, Tabriz University of Medical Sciences, Tabriz, Iran

[*]*Corresponding author*: Samad EJ Golzari, MD, Research Center for Evidence Based Medcine, Tabriz University of Medical Sciences, Tabriz, Iran. Tel: +98-9141151894, E-mail: dr.golzari@hotmail.com

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Patients are at increased risk of lung injury throughout the perioperative period. Numerous intraoperative measures have been postulated and implemented to modulate anesthesia- and ventilation-related injuries. Based on these studies, PEEP has been suggested to both improve oxygenation and keep the lungs open in anesthetized patients if the operation lasts for more than two hours. Nevertheless, if the anesthesia continues for less than two hours, FEEP is appropriate only for keeping the lungs open rather than improving oxygenation (1). Accordingly, applying PEEP is superior to ZEEP in anesthetized patients to avoid postoperative atelectasis.

Any mechanical ventilation strategy consisting of high levels of PEEP and low tidal volume is believed to be beneficial for patients and not to result in barotrauma, longer duration of mechanical ventilation or mortality (2, 3). Previous studies suggesting reduction of pulmonary inflammation following surgery used high levels of PEEP with low tidal volume during general anesthesia (4); whereas, some recent large studies suggest that the use of high levels of PEEP can be associated with increased levels of some plasma biomarkers. Nevertheless, a limitation of these studies is lack of following the lung protective strategy based on the low volume strategy and setting the tidal volume to higher values (i.e. 8 mL/Kg of the PBW). Such strategies not only might affect the results obtained from these studies but also should be avoided in order not to impose any further damage to the patients with simultaneous use of higher PEEP levels (5).

The distribution of ventilation within the lungs, especially during mechanical ventilation, even in healthy lungs is heterogeneous. This heterogeneity can change the effect of PEEP on different lung regions. In some areas, it may be insufficient to keep the alveoli open; and in some areas, it may lead to over inflation with subsequent lung tissue injury and inflammation. Therefore, enhanced oxygenation ought not to be interpreted as improved outcomes, as it not only would not be associated with any benefits in outcomes but also would harm the patients. Clinicians might be falsely reassured that the patients are in clinically stable state and overlook what lies beneath. There is no "global optimal PEEP"; optimal PEEP and ventilator setting adjustment must be personalized according to physiologic and mechanical parameters (pulmonary, hemodynamic, etc.) of every individual in order to prevent any ventilator induced lung injury.

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