



PEEP on postoperative complications: not to fast

Xiao Zhaoyang¹ · Zheng Xin¹

Received: 28 November 2023 / Accepted: 6 December 2023 / Published online: 20 December 2023
© The Author(s) under exclusive licence to Japanese Society of Anesthesiologists 2023

Keywords PEEP · Postoperative · Complications

To the Editor:

We read with sincerity, the study published in journal of anesthesia with the title of: Effect of driving pressure-guided by individualized positive end-expiratory pressure on oxygenation undergoing robot-assisted laparoscopic radical prostatectomy: a randomized controlled trial [1].

Though there are many researches on mechanical ventilation in perioperative period, positive end-expiratory pressure (PEEP) is also one of the most important directions. But there is a lot of debate about PEEP.

Whether PEEP can improve pulmonary atelectasis cannot be monitored in real time under most conditions, in clinical practice, ultrasound is the most feasible. As a non-physiological positive pressure ventilation, mechanical ventilation itself can induce a number of systemic responses including systemic inflammation and lung injury [2], Mechanical ventilation can stimulate alveolar epithelial cells, secrete inflammatory factors, activate aseptic inflammatory response, and promote the occurrence of lung injury proportional to the pressure of mechanical ventilation [3].

The effect of PEEP is doubtful in non-ARDS patients; patients with ARDS have alveolar exudation, pulmonary atelectasis, and endogenous high driving pressure [4].

PEEP did not improve prognosis in the chest surgery, and perioperative lung injury was directly associated with acute inflammatory response [2, 5]. Although atelectasis is

common, PACU studies have found that the use of positive pressure ventilation can reduce the incidence of atelectasis, but there is no advantage in the incidence of hypoxemia [6]. A study from intensive care unit indicate severe hypoxemia is more associated with pulmonary edema, oxygenation index is more associated with pulmonary edema, the lower the oxygenation index, the more serious the pulmonary edema [7].

The conclusion of ultra-low tidal volume ventilation for lung protection is inconclusive, further confirmed that the kind of mechanical ventilation had no significant effect on the prognosis of patients [5, 8].

Driving-pressure-guided PEEP did not reduce the 30-day mortality in several RCT trials, in an article of retrospective analysis of mechanical ventilation 16 RCTs with a total sample size of 4993. Mechanical ventilation had no decisive effect on the prognosis of patients, optimal kind of mechanical ventilation is unclear. Perhaps improved perioperative oxygen saturation, possibly based on alveolar hyperinflation [9].

Lung recruitment maneuvers can improve oxygenation and is simple and feasible, even in patients with ARDS, perioperative application is more feasible to reduce atelectasis [10].

Although it is not so fast to give conclusions about the use of PEEP in perioperative period, we believe that perioperative lung protection should focus more on the prevention of inflammatory response and the application of lung reexpansion, promoting alveolar surfactant production which may also benefit patients.

This comment refers to the article available online at <https://doi.org/10.1007/s00540-023-03251-y>.

✉ Zheng Xin
zhengxin008@163.com

Xiao Zhaoyang
xiaozhaoy2012@163.com

¹ Department of Anesthesiology, The Second Hospital of Dalian Medical University, Dalian, Liaoning Province, China

Author contributions ZX was the main author of this manuscript. ZX contributed to the conception and design of the study, and acquisition of data. ZX and XZ contributed to the analysis and interpretation of data.

Data availability The datasets availability from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declare that they have no competing interests.

References

- Li Y, Wenwen Xu, Yingpeng Cui Yu, Sun CW, Wen Z, An Ke. Effect of driving pressure-guided by individualized positive end-expiratory pressure on oxygenation undergoing robot-assisted laparoscopic radical prostatectomy: a randomized controlled trial. *J Anesth.* 2023;37(6):896–904. <https://doi.org/10.1007/s00540-023-03251-y>. (Epub 2023 Sep 14 PMID: 37707572).
- Albaiceta GM, Brochard L, Dos Santos CC, Fernandez R, Georgopoulos D, Girard T, Jubran A, Lopez-Aguilar J, Mancebo J, Pelosi P, Skrobik Y, Thille AW, Wilcox ME, Blanch L. The central nervous system during lung injury and mechanical ventilation: a narrative review. *Br J Anaesth.* 2021;127(4):648–59.
- Jianbo Wu, Yan Z, Schwartz DE, Jingui Yu, Malik AB, Guochang Hu. Activation of NLRP3 inflammasome in alveolar macrophages contributes to mechanical stretch-induced lung inflammation and injury. *J Immunol.* 2013;190(7):3590–9.
- Meyer NJ, Gattinoni L, Calfee CS. Acute respiratory distress syndrome. *Lancet.* 2021;398:622–37.
- Colquhoun DA, Leis AM, Shanks AM, Mathis MR, Naik BI, Durieux ME, Kheterpal S, Pace NL, Popescu WM, Schonberger RB, Kozower BD. A lower tidal volume regimen during one lung ventilation for lung resection surgery is not associated with reduced postoperative pulmonary complications. *Anesthesiology.* 2021;134(4):562–76.
- Jeong H, Tanatporn P, Ahn HJ, Yang M, Kim JA, Yeo H, Kim W. Pressure support versus spontaneous ventilation during anesthetic emergence—effect on postoperative atelectasis: a randomized controlled trial. *Anesthesiology.* 2021;135:1004–14.
- Qianyi P, Lina Z, Li Li, Meilin Ai, Zhang Yanxin Hu, Chenghuan CY, Wei He, Yuhang Ai. The lung ultrasound characteristics of critical care postoperative patients using BLUE-plus protocol. *Chin J Ultrasonogr.* 2017;26:976–81.
- Buiteman-Kruizinga LA, Schultz MJ. Ultra-low tidal volume ventilation for lung protection: not so fast. *Lancet Res Med.* 2023;11:949–50.
- Buonanno P, Marra A, Iacovazzo C, Vargas M, Coviello A, Squillacioti F, Nappi S, de Siena AU, Servillo G. Impact of ventilation strategies on pulmonary and cardiovascular complications in patients undergoing general anaesthesia for elective surgery: a systematic review and meta-analysis. *Br J Anaesth.* 2023;131(6):1093–101.
- Zampieri FG, Costa EL, Iwashyna TJ, Carvalho CRR, Damiani LP, Taniguchi LU, Amato MBP, Cavalcanti AB. Heterogeneous effects of alveolar recruitment in acute respiratory distress syndrome: a machine learning reanalysis of the alveolar recruitment for acute respiratory distress syndrome trial. *Br J Anaesth.* 2019;123(1):88–95.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.