Editorial

Protective intraoperative ventilation during thoracic surgery: definitively yes!

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Provenance: This is an invited Editorial commissioned by the Section Editor Shuangjiang Li (Department of Thoracic Surgery and West China Medical Center, West China Hospital, Sichuan University, Chengdu, China).

Comment on: Marret E, Cinotti R, Berard L, et al. Protective ventilation during anaesthesia reduces major postoperative complications after lung cancer surgery: A double-blind randomised controlled trial. Eur J Anaesthesiol 2018;35:727-35.

Submitted Dec 13, 2018. Accepted for publication Dec 20, 2018.

doi: 10.21037/jtd.2018.12.129

View this article at: http://dx.doi.org/10.21037/jtd.2018.12.129

In their large, high-quality randomized clinical trial (RCT), Merret *et al.* provided evidence that protective intraoperative ventilation with low tidal volume and PEEP improves clinically relevant outcomes in patients undergoing lung cancer surgery (1). In fact, in the protective intraoperative ventilation group, the authors found a statistically significant reduction in major postoperative complications such as pneumonia, acute lung injury, acute respiratory distress syndrome, pulmonary embolism, shock, myocardial infarction or death within 30 days after surgery. Moreover, in the same group, they reported a statistically significant reduction in hospital stay [11 (interquartile range, 9 to 15) *vs.* 12 (9 to 16) days, P=0.048] and in the incidence of other complications such as supraventricular cardiac arrhythmia, bronchial obstruction, pulmonary atelectasis, hypercapnia, bronchial fistula and persistent air leak (37.2% *vs.* 49.4%, odds ratio 0.60, 95% confidence interval, 0.39 to 0.92, P=0.02).

This trial represents the turning point in the history of the protective intraoperative ventilation strategy in thoracic surgery since it finally provides adequate power to draw definitive conclusions. In fact, previous randomized clinical trials performed in this setting were unconclusive due to the small size, the inconsistent interventions and the incomparable data (2). Thanks to Merret *et al.* if we now meta-analyze all the eleven RCTs in which small tidal volume was used intraoperatively in patients undergoing one lung ventilation for thoracic surgery, we can clearly see that protective ventilation reduces the incidence of postoperative pulmonary complications (P=0.03) (Figure 1). This is not surprising since it's well known that mechanical ventilation can be very harmful even in healthy lung, activating physiological mechanisms leading to ventilator-induced lung injuries (3). Let alone how mechanical ventilation could be detrimental in pathological lungs undergoing surgical resection. Nonetheless, previous published studies did not confirm an association between an easy to guess harmful ventilation and the development of postoperative pulmonary complications in thoracic surgery. Therefore, it's probably not so surprising that recent large observational studies showed that higher tidal volumes and little/no PEEP (positive end expiratory pressure) are still widely used in modern anaesthesiological practice (4-6). On one hand, this evidence could be due to the fact that changes in consolidated usual practice are always difficult to introduce, in particular by elderly anaesthesiologists. On the other hand, it's comprehensible that concerns about the necessity of protective mechanical ventilation for patients without pre-existing lung disease who will undergo to a few hours surgical intervention are legitimate. In fact, it should not be forgot that the use of PEEP and tolerance to hypercapnia could be considered antithetical to the anaesthesiological intra and postoperative targets: intraoperative haemodynamic stability and prompt postsurgical extubation. Fortunately, the trial of Merret *et al.* will finally help clinicians to do the right choice. In fact, if

legitimate concerns could eventually exist in healthy-lung patients undergoing general anaesthesia for different kind of surgical procedures, now even the most "evidence based medicine addicted" anaesthesiologist won't find any pretext to use high tidal volume and low PEEP in lung cancer surgery patients.

After all, the incidence of postoperative pulmonary complications is extremely high, in particular for thoracic surgery, ranging from 6% to 80% in literature (7), depending on different definitions, severity (from atelectasis to acute respiratory distress syndrome) and pre-existing risk factors (8,9). Moreover, it's well known that the occurrences of any postoperative pulmonary complication adversely influence postoperative morbidity and mortality, especially within the first week after surgical intervention (10-12). Therefore, considering that nearly 230 millions major surgical procedures are performed annually worldwide, any intervention able to reduce even a very little percentage of the incidence of postoperative respiratory complications could improve the outcome of millions of patients and must be absolutely adopted.

Acknowledgements

None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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Cite this article as: Pasin L. Protective intraoperative ventilation during thoracic surgery: definitively yes! J Thorac Dis 2019;11(Suppl 3):S341-S342. doi: 10.21037/jtd.2018.12.129

