

Limitations of Observational Study Designs When Comparing Lung Isolation Techniques [Letter]

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Dear editor

Unlike many previous trials that have focused on process, Li and colleagues have laudably compared an adverse event that may have an important impact on patient outcome; that is, postoperative pulmonary infection associated with lung isolation using bronchial blockers (BBs) and double-lumen endobronchial tubes (DLTs) for video-assisted thorascopic surgery (VATS).^{1,2} However, the robustness of their conclusion that, compared to DLTs, BBs are associated with a lower incidence of pulmonary infection, is undermined by their use of an historical, cohort, observational study design.²

The effectiveness of lung isolation is highly influenced by the technique chosen and its application.³ For these reasons, observational studies of lung isolation are highly vulnerable to both selection and treatment biases. Whilst it might reduce the magnitude of the impact, the propensity matching used by Li and colleagues will not eliminate selection bias.² More importantly, propensity matching will not reduce treatment bias in any way. Indeed, the significant differences in gas exchange and ventilatory outcomes in Table 3 clearly establish that the treatment of intermittent positive pressure ventilation (IPPV) was managed differently in patients with BBs and DLTs.

Effective lung isolation with BBs or DLTs using a standardised approach to management of IPPV should result in equivalent respiratory dynamics. For this reason, the significantly lower averaged, intra-operative mean and peak airway pressures both indicate that, in the anaesthesiologists' practice described in this study, BBs were less effective at isolating the main bronchus than DLTs. Consequently, ventilated gases were more likely to bypass BB balloons than bronchial cuffs of DLTs, so increasing the physiological dead-space and thus making carbon dioxide (CO₂) excretion less efficient and the end-tidal (Et) CO₂ concentration significantly higher. Unsurprisingly, the anaesthesiologists appear to have responded to an elevated EtCO₂ above their upper threshold by significantly increasing the respiratory rate of IPPV so as to increase the minute volume to facilitate increased CO₂ excretion.

Whatever the cause of these significant differences, the IPPV treatment received by patients with BBs was systematically different to that of DLT patients, thus making it impossible to determine whether lower incidence of pulmonary infection associated with BBs is the result of the lung isolation technique or the difference in the management of IPPV. Future research comparing outcomes from the choice of lung isolation technique for VATS should reject retrospective, observational study designs and adopt robust, prospective, randomised controlled trial designs and include assessment of the effectiveness of lung isolation to eliminate selection bias and identify whether treatment bias is present.

Disclosure

The author reports no conflicts of interest in this communication.

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