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Effects of Lung Protection Ventilation Strategies on Postoperative Pulmonary Complications After Noncardiac Surgery: A Network Meta-Analysis of Randomized Controlled Trials

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Abstract : Background: Mechanical ventilation has been confirmed to increase the incidence of postoperative pulmonary complications (PPCs), and several studies have shown that low tidal volumes combined with positive end-expiratory pressure (PEEP) and recruitment manoeuvres (RM) reduce the incidence of PPCs. However, the optimal lung-protective ventilatory strategy remains unclear. Methods: Multiple databases were searched for randomized controlled trials (RCTs) published prior to October 2023. The association between individual PEEP (iPEEP) or other forms of lung-protective ventilation and the incidence of PPCs was evaluated by Bayesian network meta-analysis. Results: We included 58 studies (11610 patients) in this meta-analysis. The network meta-analysis showed that low ventilation (LVt) combined with iPEEP and RM was associated with significantly lower incidences of PPCs [HVt: OR=0.38 95CrI (0.19, 0.75), LVt: OR=0.33, 95% CrI (0.12, 0.82)], postoperative atelectasis, and pneumonia than was HVt or LVt. In abdominal surgery, LVT combined with iPEEP or medium-to-high PEEP and RM were associated with significantly lower incidences of PPCs, postoperative atelectasis, and pneumonia. LVt combined with iPEEP and RM was ranked the highest, which was based on SUCRA scores. Conclusion: LVt combined with iPEEP and RM decreased the incidences of PPCs, postoperative atelectasis, and pneumonia in noncardiac surgery patients. iPEEP-guided ventilation was the optimal lung protection ventilation strategy. The quality of evidence was moderate.

Keywords : protection ventilation strategies, postoperative pulmonary complications, network meta-analysis, noncardiac surgery
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