INDIVIDUALIZED POSITIVE END EXPIRATORY PRESSURE AND PULMONARY COMPLICATIONS: A SYSTEMATIC REVIEW

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Abstract

Purpose: Ventilatory strategies with high Vt and low or no PEEP result in increased atelectasis, surfactant depletion, inflammation, edema, and fibrotic formations. Individualized PEEP following RM maintains patent alveoli throughout the ventilatory cycle reducing atelectasis and cyclic alveolar recruitment-decrecruitment. The objective of this review is to explore methods of identifying individualized PEEP for laparoscopic surgical patients and to determine whether outcomes data show a change in postoperative pulmonary complications.

Methodology: Six databases were reviewed for studies on the use of individualized PEEP for laparoscopic surgeries. 670 articles were screened for relevance, 122 articles were further screened for applicability, 10 articles were appraised for inclusion, and 6 articles were included in the synthesis of evidence. Inclusion criteria included adult patients undergoing surgery involving pneumoperitoneum.

Results: EIT-guided individualized PEEP resulted in greater pulmonary compliance, higher PaO2:FiO2, lower driving pressures, higher EELV, and similar rates of vasopressor use when compared to standardized PEEP of 4-5 cm H2O. Two studies utilized maximal compliance methods of determining individualized PEEP. Both studies identified improved intraoperative compliance, atelectasis, PaO2:FiO2, and driving pressures and one reported greater volume of crystalloid infusions and vasopressor utilization in the interventional group. One study utilized lung ultrasound scoring to guide individualized PEEP. This intervention resulted in higher PaO2:FiO2 and lower incidence of postoperative hypoxia. A lower MAP was noted in the intervention group.

Implications for Practice and Research: Open lung ventilation via individualizing PEEP improves intraoperative driving pressures and oxygenation and may result in negative hemodynamic consequences. With careful consideration of hemodynamic status, individualized PEEP improves intraoperative pulmonary indices. Sufficient evidence was not found to indicate reduced postoperative pulmonary complications. Future research should include esophageal manometry, lung ultrasound individualized PEEP, and emphasize obese populations. Larger studies with higher power are needed to identify potential impacts on outcomes.