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VENTILATION WITH HIGH TIDAL VOLUME AND HIGH PEEP IS NOT INJURIOUS IN AN INFANT RAT PNEUMONIA MODEL

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Objective: To study the impact of high V_T ventilation on top of elevated positive end-expiratory pressure (PEEP) in an infant rat pneumonia model.

Methods: Two week old rats received lipopolysaccharide (LPS) via trachea. After 24 hours rats were allocated to 4 hours of ventilation with a V_T of 6 or 12 mL/kg at PEEP 6 cmH_2O or a V_T of 6 or 12 mL/kg at PEEP 10. Also, lung injury was assessed in non-ventilated LPS and saline groups. Pressure-volume curves were constructed and airway resistance (R_{aw}) and the coefficient of tissue elastance (H) were obtained from low-frequency forced oscillatory impedance. Cytokine and protein concentrations were measured in bronchoalveolar lavage fluid (BALF).

Results: At lower PEEP high V_T ventilation produced insignificant changes of lung mechanics whereas low V_T ventilation resulted in a linear rise in R_{aw} and H by 13 and 41%, respectively. Though R_{aw} and H significantly decreased with both strategies at higher PEEP, lung function improvement was more pronounced in combination with high V_T ventilation. Quasi-static lung compliance improved the most with high V_T and high PEEP. Macrophage inflammatory protein-2 and interleukin-6 concentrations in BALF were higher in all ventilated animals when compared to non-ventilated animals. Increased BALF protein concentration was related to previous LPS exposure and independent of applied ventilation strategy.

Conclusion: Short-term mechanical ventilation with high V_T and high PEEP is not injurious in infant rats with pre-injured lungs. Absence of augmented ALI might be explained by maximum lung volume recruitment and minimal atelectasis-induced shear stress.

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IN-LINE FILTRATION REDUCES SIRS IN CRITICALLY ILL CHILDREN

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Objectives: Sepsis, systemic inflammatory response syndrome (SIRS) or organ failure often complicate the clinical course on intensive care units. Particulate contamination of infusion solution may contribute to clinical deterioration of these patients. Particles have been shown to induce thrombogenesis, deterioration of microcirculation and modulation of immunoresponse. In-line filtration almost completely prevents particulate infusion.We assessed the effect of in-line filtration on reduction of major complications in critically ill children (Clinical Trials.gov ID NCT 00209768).

Patients and Methods: In a randomised, prospective trial children admitted to interdisciplinary PICU of tertiary university hospital were assigned to either control or interventional group, the latter receiving in-line filtration (infusion filter Pall ELD96LLCE/ NOE96E, Braun Intrapur Lipid/ Intrapur Neonat Lipid) throughout infusion therapy. Prior to this study, infusion regiment was optimised to prevent precipitation and incompatibilities of solutions and drugs. Primary objectives included a reduction in incidence of sepsis, thrombosis, systemic inflammatory response syndrome (SIRS), organ failure (liver, lung, kidney, circulation) and mortality.

Results: 807 children (343 female, 464 male) with heterogeneous background of underlying diagnoses and Gaussian distribution to either control or in-line filtration group were included. According to study criteria a significant reduction in incidence of SIRS for interventional group (95% CI, 145 versus 200 patients, $P< 0.001$) was evident. No differences were demonstrated for occurrence of sepsis, thrombosis, organ failure (liver, lung, kidney, circulation) or mortality between both groups. **Conclusion:** SIRS often complicates treatment in intensive care medicine. Inline-filtration is most effective reducing the incidence of SIRS and offers a novel therapeutic option.