A481 - Expiratory ventilation assistance improves arterial oxygenation in ARDS – a randomized controlled study in pigs

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Introduction:
Mechanical ventilation aggravates ARDS. Expiratory ventilation assistance (EVA) showed an improved oxygenation in lung healthy pigs with similar tracheal pressure ($p_{\text{trach}}$) amplitude and tidal volume ($V_T$). We hypothesized that EVA improves gas exchange and attenuates ventilator induced lung injury in a porcine model of ARDS.

Methods:
19 pigs with an oleic acid induced moderate ARDS (initial Horovitz index (HI) 100-150 mmHg) were randomly allocated to volume controlled ventilation or EVA ventilation with identical ventilation parameters (FiO$_2$ 0.8, $V_T$ 7 ml/kg body weight, PEEP 9 mbar, respiratory rate set to maintain arterial blood pH >7.2). PaO$_2$ and $p_{\text{trach}}$ were measured every 30 min. After 3h lung tissue was excised, stained and alveolar wall thickness measured. Statistics were performed with linear mixed model analyses and unpaired t-test.

Results:
5 pigs were excluded due to HI < 100 mmHg (n=2), malignant arrhythmia (n=1) and software error (n=2). EVA elevated PaO$_2$ (107±11.3 vs. 164±21 mmHg, p=0.04) and mean $p_{\text{trach}}$ (16.7±1.6 vs. 21.5±1.1 mbar, p<0.0001). Alveolar walls were thinner in the EVA group (7.8±0.2 vs. 5.5±0.1 µm, p<0.0001).

Conclusion:
EVA ventilation improves gas exchange due to elevated mean $p_{\text{trach}}$ in experimental ARDS. Reduced alveolar wall thickness indicates potential lung protective effects.

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