Category :**Respiratory: mechanical ventilation**

A313 - ***Sidestream-dark field videomicroscopy for the in vivo evaluation of the pulmonary alveoli and microcirculation in mechanically ventilated pigs***

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Introduction:

Under mechanical ventilation, the pulmonary microcirculation can be affected by the expansion or collapse of alveoli, resulting in a change in pulmonary vascular resistance. Sidestream-dark field (SDF) videomicroscopy has been used in animal models to assess pulmonary microcirculation *in vivo*. This study aimed to evaluate whether different mechanical ventilation settings could affect the alveolar size and pulmonary vessels in a porcine model.

Methods:

This experimental study was conducted in four healthy pigs on mechanical ventilation under general anesthesia. The ventilation was initially set at a Tidal Volume (VT) of 8 ml/kg, PEEP 5 cmH2O, and FiO2 50%. Access to the thoracic cavity was obtained through surgical thoracotomy. The subpleural pulmonary microcirculation was assessed using SDF videomicroscopy at different ventilator settings: VT 8 ml/kg, PEEP 5 cmH2O, FiO2 50%; VT 12 ml/kg, PEEP 5 cmH2O, FiO2 50%; VT 8 ml/kg, PEEP 12 cmH2O, FiO2 50%; VT 8 ml/kg, PEEP 5 cmH2O, FiO2 100%. We calculated the diameter of the alveoli and extra-alveolar microvessels.

Results:

Comparing VT 8 ml/kg and VT 12 ml/kg, we observed a significant increase in alveolar diameter (89 [70,6 – 114,7] μm vs 94,6 [78,3 – 115] μm, $p = 0,04$) and a significant decrease in vessels diameter (10,4 [8,6 – 12,7] μm vs 9,2 [7,6 – 11,2] μm, $p < 0,01$). We did not observe a significant difference in alveolar and vessels diameters after changing the PEEP from 5 cmH2O to 12 cmH2O. Increasing the FiO2 from 50% to 100%, the alveolar diameter significantly raised (86,7 [69,6 – 112,6] μm vs 94 [72,7 – 122,5] μm, $p = 0,03$) as well as the vessels diameter (10,4 [8,5 – 12,5] μm vs 12,2 [10,3 – 14,7] μm, $p < 0,01$). Subpleural pulmonary microcirculation is shown in *Figure 1*.

Conclusion:

Mechanical ventilation affects alveolar and pulmonary vessel size. SDF microscopy represents a valid tool to assess the subpleural pulmonary microcirculation *in vivo* in porcine models.

Image :

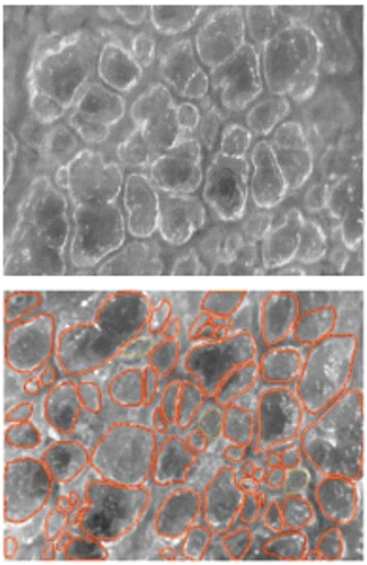

Figure 1. Subpleural pulmonary microcirculation.