L. PHYSIOLOGY OF INTERVENTIONAL LUNG ASSIST / EXPERIMENTAL STUDIES

COMBINATION OF ARTERIOVENOUS EXTRACORPOREAL LUNG ASSIST AND HIGH-FREQUENCY OSCILLATORY VENTILATION IN A PORCINE MODEL OF LAVAGE-INDUCED ACUTE LUNG INJURY: A RANDOMIZED CONTROLLED TRIAL

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J TRAUMA. 2007 Feb;62(2):336-46

Objective
To compare the combined effects of arteriovenous extracorporeal lung assist (AV-ECLA) and high-frequency oscillatory ventilation (HFOV) on pulmonary gas exchange, hemodynamics, and respiratory parameters in a lavage-induced porcine lung injury model.

Study Design
Prospective, randomized animal study in 33 healthy female pigs.

Methods
ARDS was induced by saline lung lavage until the PaO₂ decreased to 53 ± 8 mmHg. The animals were randomly assigned to four groups:
Group 1, pressure-controlled ventilation (PVC) with Vt of 6ml/kg BW; group 2, PCV with Vt of 6 ml/kg BW and AV-ECLA; group 3, HFOV; group 4, HFOV and AV-ECLA. In group 2 and 4, the femoral artery and vein were cannulated and a low-resistance membrane lung was interposed. After isolated evaluation of AV-ECLA, the mean airway pressure was increased by 3 cm H₂O from 16 to 34 cm H₂O every 20 minutes, accompanied by blood gas analyses and measurements of respiratory and hemodynamic variables.

Results
Only in AV-ECLA-treated animals was normocapnia achieved. No significant increase of PaO₂ attributable to AV-ECLA alone was detected. Mean airway pressure augmentation resulted in a significant increase in PaO₂ in all groups. Peak inspiratory pressure was significant lower in HFOV-treated animals.

Discussion
The combination of AV-ECLA and HFOV resulted in normocapnia and comparable PaO₂, although a smaller ventilator pressure amplitude was applied. Long-term animal studies are needed to assess whether this approach results in further lung protection.