



High-frequency percussive ventilation with systemic heparin improves short-term survival in a LD100 sheep model of acute respiratory distress syndrome.

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We undertook an assessment of high-frequency percussive ventilation (HFPV) and systemic heparin on survival in our LD100 sheep model of smoke/burn-induced acute respiratory distress syndrome (ARDS). This was a prospective controlled outcomes study in a large animal critical care laboratory. ARDS was induced in 13 sheep by a combination of 48 cotton smoke breaths and 40% full-thickness cutaneous burn (LD100) followed by mechanical ventilation (15 ml/kg tidal volume). After meeting ARDS criteria ($\text{PaO}_2/\text{FiO}_2 < 200$), the sheep were divided into high-frequency percussive ventilation (HFPV; $n = 7$) or volume-controlled mechanical ventilation (VCMV; $n = 6$) groups. Both groups received systemic heparin to achieve an ACT 180-300 seconds. HFPV was managed with the Volumetric Diffusive Respiration Ventilator (Percussionaire Corp., Sandpoint, ID). The VCMV group was managed with up to 10 ml/kg tidal volume. Arterial blood gases and ventilator settings were monitored every 6 hours after onset of ARDS. HFPV did not affect sheep hemodynamics. Survival 84 hours after smoke and burn injury was significantly greater in the HFPV (7/7, 100%) compared with the VCMV group (3/6, 50%, $P < .05$). PaCO_2 was significantly greater in VCMV group at 36, 48, and 72 hours after smoke and burn injury. $\text{PaO}_2/\text{FiO}_2$ after 36 hours of smoke and burn injury in the HFPV group was improved compared with the VCMV group, but no statistical difference was found. In the VCMV group, peak airway pressure was decreased to 19.7 ± 2.2 cm H₂O at 36 hours from 29 ± 2.8 at 24 hours as the tidal volume changed from 15 ml/kg to 10 ml/kg and then gradually increased to 39 ± 5.6 cmH₂O at 72 hours. In the HFPV group, peak inspiratory pressure kept constant at a level of 30 cmH₂O. In our smoke/burn-induced LD100 sheep model of ARDS, volume-controlled mechanical ventilation with systemic heparin achieved a 50% survival whereas HFPV with systemic heparin achieved 100% survival at 60 hours after the onset of ARDS. PMID: 16819349 [PubMed - indexed for MEDLINE]

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