



## Gas exchange during conventional and high-frequency pulse ventilation in the surfactant-deficient lung: influence of positive end-expiratory pressure.

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High-frequency pulse ventilation (HFPV) was compared to conventional ventilation (CV) in a model of severe respiratory failure induced by serial lung lavages with warm saline in 8 mongrel dogs. Before the lavage, during HFPV at 4 Hz with a pulse volume (PV) of 125 ml, mean PaO<sub>2</sub> was 107 torr and mean PaCO<sub>2</sub> was 34 torr. After the last lavage, during CV at an inspired oxygen fraction FIO<sub>2</sub> of 1.0 and a tidal volume (V<sub>T</sub>) of 535 ml, the PaO<sub>2</sub> averaged 60 torr and PaCO<sub>2</sub> was 45 torr. At a FiO<sub>2</sub> of 0.21, 20 CmH<sub>2</sub>O of positive end-expiratory pressure (P<sub>EEP</sub>) was applied to prevent hypoxemia. The resulting PaO<sub>2</sub> was 87 torr; PaCO<sub>2</sub> was 40 torr. Peak airway pressure (P<sub>pa</sub>) rose from 21 to 51 cm H<sub>2</sub>O. When ventilation was switched to HFPV on room air, a PV similar to the control levels was associated with severe hypoxemia (PaO<sub>2</sub> less than 45 torr, PaCO<sub>2</sub> greater than 50 torr). As PV was increased PaO<sub>2</sub> improved, reaching 113 torr at a PV of about 470 ml. The corresponding mean airway pressure (P<sub>aw</sub>) was about 20 CmH<sub>2</sub>O. Thus, application of P<sub>EEP</sub> during HFPV at low PV did not improve PaO<sub>2</sub> even when measured Paw approximated 20 CmH<sub>2</sub>O. This suggests that HFPV with high PV is more effective than either CV with P<sub>EEP</sub>, or HFPV with low PV and P<sub>EEP</sub>.

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