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## LUNG ALERT .....

### Clinical assessments of high frequency oscillatory ventilation

▲ Mentzelopoulos S, Roussos C, Koutsoukou A, *et al*. Acute effects of combined high frequency oscillation and tracheal gas insufflation in severe acute respiratory distress syndrome. *Crit Care Med* 2007;**35**:1500–08.

▲ Hager D, Fessler H, Kaczka D, *et al*. Tidal volume delivery during high-frequency oscillatory ventilation in adults with acute respiratory distress syndrome. *Crit Care Med* 2007;**35**:1522–29.

**T**he first study compares the effect of three modes of ventilation on cardiovascular and respiratory physiologic variables in 14 patients with acute respiratory distress syndrome (ARDS). The modes of ventilation were:

- conventional mechanical ventilation (CMV) using the ARDS Network Protocol
- high frequency oscillation (HFO)
- HFO combined with tracheal gas insufflation (TGI)

The initial mode was CMV. Patients were placed on both HFO and HFO–TGI for 2 hour intervals and measurements were made. The order of the HFO modes was random. HFO–TGI significantly improved PaO<sub>2</sub>/FIO<sub>2</sub> (174.5 v 105.0), mixed venous partial pressure of oxygen (50.1 v 43.3), mixed venous oxygen saturation (77.8 v 77.1) and shunt fraction (0.36 v 0.45) when compared with CMV. HFO–TGI significantly improved PaO<sub>2</sub>/FIO<sub>2</sub> (174.5 v 136) and oxygenation index (17.1 v 22.3) when compared with HFO. These improvements were lost when patients were returned to CMV. Hemodynamics and respiratory mechanics were unchanged with the three modes of ventilation.

This study showed that HFO–TGI improved measures of oxygenation when compared with HFO and CMV without changing respiratory mechanics or hemodynamics.

The second study examined how ventilator and patient variables affect tidal volumes during HFO. Measurements were made on an artificial lung model of ARDS and seven patients with ARDS. Tidal volumes in the lung model varied between 23 and 225 ml. The ventilator variables exhibiting the greatest effect on the tidal volumes included oscillator frequency, pressure amplitude and endotracheal tube diameter. Changes in test lung compliance and mean airway pressure had little effect on tidal volume. Tidal volumes in the ARDS patients varied between 44 and 210 ml. Changing oscillator frequency had a similar effect in the patients with ARDS patients as it did in the lung model (23.1% v 21.3%). Changing pressure amplitude had a much smaller effect in the patients with ARDS than it did in the lung model (5.6% v 21.4%). Endotracheal tube diameter was constant in all ARDS patients (8.0 mm).

This second study shows that lung volumes delivered with HFO were small compared with conventional ventilation and that changing oscillator frequency had the biggest effect on tidal volumes in patients with ARDS.

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