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Choosing optimal P_{AW} during high-frequency oscillation

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Context

High-frequency oscillation (HFO) is increasingly used as rescue therapy in adults with severe ARDS. Ventilating with the lower pressure above the lower corner pressure (PCL), and upper pressure below the upper corner pressure of the pressure-volume (P-V) curve, should result in more recruitment and less ventilator induced injury. Currently, the ventilator settings are based on the settings of the conventional ventilator prior to HFO and on trial and error. In this paper the authors questioned whether the mean airway pressure (P_{AW}) resulting in optimal oxygenation could be predicted from the inflation limb of the P-V curve of the injured lung.

Significant findings

A P_{AW} equal to $PCL + 6$ cm H₂O optimised oxygenation without adversely affecting haemodynamics. Lower pressures had a suboptimal effect on oxygenation, whilst higher pressures yielded no additional advantage to oxygenation, but adversely affected haemodynamics.

Comments

This is a useful piece of work that may assist in determining initial ventilator settings for HFO. One major limitation of the model used is that the lung injury induced was as a result of surfactant removal with saline lavage. Whether these results would still hold in the clinical situation, where ARDS is a result of many factors, remains to be seen.

Methods

Sheep model using saline lavage to produce severe lung injury; inspiratory and expiratory P-V curves constructed using a 2-l syringe; invasive monitoring of haemodynamic variables; animals subjected to four cycles of HFO at different P_{AW}.

Additional information

References

1. Goddon S, Fujino Y, Hromi J, Kacmarek R: Optimal mean airway pressure during high-frequency oscillation (predicted by pressure-volume curve). *Anesthesiol.* 2001, 94: 862-869.