

Category : **Respiratory: monitoring**

A216 - A new method for estimating spontaneous breathing effort using changes in central venous pressure: a pig model study.

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Introduction:

The standard method for evaluating spontaneous respiratory effort is by esophageal pressure measurement. However, this method requires a special device that is not readily available. In contrast, central venous catheters are commonly used in critically ill patients, and central venous pressure is known to vary depending on changes in intrathoracic pressure (ΔP_{pl}). We previously reported a simple correction method for estimating ΔP_{pl} using changes in central venous pressure (ΔCVP) in postoperative pediatric patients under spontaneous breathing assistance. This study aimed to clarify this method can evaluate ΔP_{pl} , spontaneous respiratory effort from CVP waveform, without an esophageal pressure catheter, under various respiratory mechanics in adult-sized pig respiratory failure models.

Methods:

Ten pigs (42.1 ± 1.8 kg) with lung injuries undergoing saline lung lavage procedure with spontaneous breathing assistance were selected. Each pig was subjected to 2 different chest wall compliance and 2 different airway resistance. The ratio of ΔCVP to airway pressure change during the occlusion test was measured and assumed to be constant even during normal ventilation. The magnitude of spontaneous respiratory effort during assisted ventilation was also estimated. The Bland-Altman analysis compared the estimated pleural pressure value ($e\Delta P_{pl}$) calculated from ΔCVP with the esophageal pressure measurement value (ΔP_{es}).

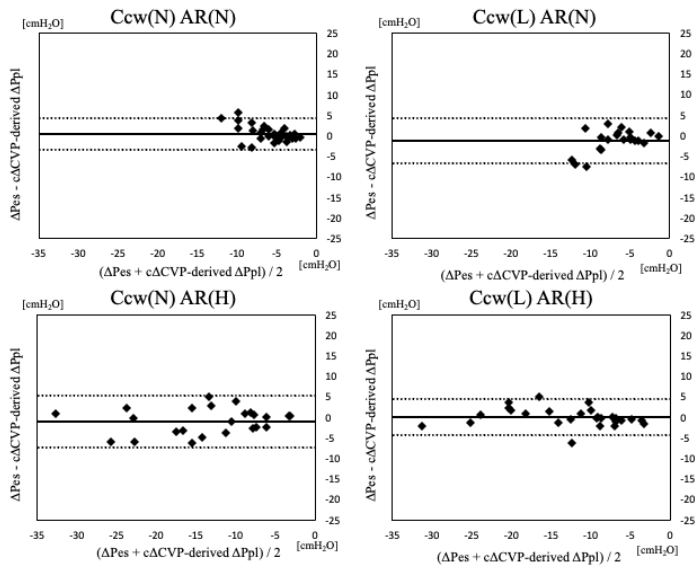
Results:

The mean and standard deviation of ΔP_{es} and $e\Delta P_{pl}$ were -9.7 ± 6.6 and -9.5 ± 6.5 cmH_2O , respectively. Bland-Altman analysis showed that the bias was -0.3 , and the precision was 2.6 cmH_2O .

Conclusion:

Our method can assess spontaneous respiratory effort with reasonable accuracy in adult-sized pigs with respiratory failure without requiring an esophageal pressure catheter across various respiratory mechanics.

Image :



Ccw(N): Normal Chest wall compliance
 Ccw(L): Low Chest wall compliance
 AR(N): Normal Airway resistance
 AR(H): High Airway resistance

The Bland–Altman analysis for the agreement between ΔP_{es} and $c\Delta CVP$ -derived ΔP_{pl} , classified by each condition.