

# Weaning from extra-corporeal support: a hypothesis for a simple approach

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Argomento: Insufficienza respiratoria acuta e ventilazione meccanica

**Background:** Extra-corporeal support is increasingly used for the treatment of acute respiratory failure and has the potential to reduce the harm of mechanical ventilation. While oxygenation impairment is the main indication to start extra-corporeal support, there are no well-established criteria for stopping it. Ideal criteria should include sufficient oxygenation, CO<sub>2</sub> elimination and the patient capability to maintain spontaneous breathing, without risk of lung injury or respiratory fatigue. If these conditions are not met, the patient would require an unsafe mechanical ventilation after weaning or re-introduction of extra-corporeal support.

**Methods:** In 14 patients, we tested a protocol of extra-corporeal support weaning by progressive stepwise reduction of gas flow (100%, 66%, 33%, 0 gas flow) and simultaneous measurement of esophageal pressure swing, respiratory rate, oxygenation and CO<sub>2</sub> removal. Our criteria for weaning success include: hemodynamic stability as assessed by the clinician, RR ≤ 30 breaths per minute, esophageal pressure swing ≤ 15 cmH<sub>2</sub>O, pH ≥ 7,25, paO<sub>2</sub> ≥ 60 mmHg, paCO<sub>2</sub> ≤ 80 mmHg. During the weaning trial we measured the EtCO<sub>2</sub> and we found that the ratio EtCO<sub>2</sub>/PaCO<sub>2</sub> was highly associated with the weaning success or failure, according to our criteria. The ideal value of this ratio is equal to 1: this would indicate a perfect gas exchange with no alveolar dead space and no shunt.

**Results:** Patients fulfilling our criteria had a high rate of decannulation and ICU dismissal (10/12 patients). At the beginning of each attempt, the mean value of the ratio was 0,85 ± 0,14 when the weaning attempt was successful and 0,68 ± 0,12 when it failed (p < 0,01). A similar difference is maintained throughout the gas flow reduction steps, as shown in figure.

**Conclusions:** EtCO<sub>2</sub>/PaCO<sub>2</sub> ratio is based on a simple but physiologically sound background. It is a good predictor of the weaning success, according to our criteria, however a larger population is required to corroborate this hypothesis.

EtCO<sub>2</sub>/PaCO<sub>2</sub> ratio during gas flow reduction

