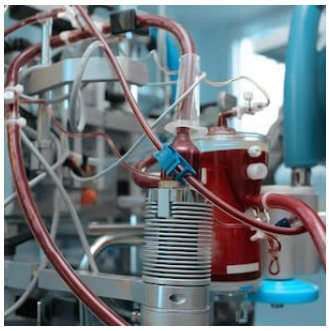
ICU
MANAGEMENT & PRACTICE

Weaning from extracorporeal systems in patients with severe COPD



A new study in the journal Critical Care demonstrates the feasibility of implementing veno-venous extracorporeal CO_2 removal (vv-ECCO$_2$R), in combination with non-invasive neurally adjusted ventilator assist (NIV-NAVA), for the treatment of severe acute exacerbation of COPD.

Investigators conducted a physiological study of the electrical activity of the diaphragm (Edi) response with varying degrees of extracorporeal CO_2 removal to control the respiratory drive in patients with severe acute exacerbation of COPD breathing on NIV-NAVA.

The Edi represents the central respiratory drive and is affected by a multitude of neural receptors. The Edi increases in response to CO_2 loading and to increased respiratory muscle loading. The Edi also increases with respiratory muscle weakness induced by hyperinflation, typically observed in COPD patients.

NAVA supports the inspiratory muscles in response to the Edi and complements the patient's effort to adjust ventilation. As NAVA is a proportional assist mode, its relative sharing of force generation with the patient remains constant throughout inspiration, regardless if they have a lower or higher Edi.

In the current study, 22 COPD patients (SAPS II 37 ± 5.6, age 57 ± 9 years) treated with vv-ECCO $_2$R and supported by NIV-NAVA were assessed during stepwise weaning of vv-ECCO$_2$R. Based on dyspnoea, tolerance, and blood gases, weaning from vv-ECCO $_2$R was successful in 12 and failed in eight patients. Patients who failed to wean from vv-ECCO$_2$R had significantly greater respiratory drive (Edi) and dyspnoea than patients who could be successfully weaned from extracorporeal support.

A high Edi signal of > 50 µV when pausing the extracorporeal system with a stable pH value of 7.4 could be predictive (ROC analysis AUC 0.95) for unsuccessful weaning of vv-ECCO$_2$R. By comparison, respiratory rate, rapid shallow breathing index, and tidal volume had lower predictive values.

These findings of the high predictive value of the Edi are consistent with a recent study demonstrating that CO $_2$ washout by nasal cannula oxygen therapy also decreases post-extubation neuro-ventilatory drive and work of breathing in patients with COPD.

However, according to study authors, randomised controlled trials of vv-ECCO$_2$R and NIV-NAVA vs. conventional invasive mechanical ventilation in patients with severe acute exacerbation of COPD are needed to confirm these findings and the efficacy of this approach.

Source: Critical Care
Image Credit: iStock

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