

EARLY TREATMENT WITH ARTERIOVENOUS EXTRACORPOREAL LUNG ASSIST AND HIGH-FREQUENCY OSCILLATORY VENTILATION IN A CASE OF SEVERE ACUTE RESPIRATORY DISTRESS SYNDROME

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Objective

To demonstrate the complimentary effects of arteriovenous extracorporeal lung assist (AV-ECLA) and high frequency oscillation ventilation (HFOV) in the treatment of ARDS with severe hypoxemia.

Study Design

Case-report.

Methods

Following car accident, a 22-year old male suffered severe bilateral lung contusions and consecutively developed severe ARDS. AV-ECLA was started shortly after ICU admission, as the most beneficial effect on outcome was observed when AV-ECLA was started in an early stage of ARDS. As oxygenation ($\text{PaO}_2/\text{FiO}_2$ -ratio = 61 mmHg) did not improve with increasing PEEP (26 cm H_2O) and PIP was still very high (39 cm H_2O), HFOV ($\text{FiO}_2 = 1.0$; frequency = 8-10 Hz; bias flow = 30l/min; pressure amplitude = 40-60 cm H_2O ; inspiratory time = 50%) was started.

Results

Oxygenation improved ($\text{PaO}_2/\text{FiO}_2$ -ratio = 137mmHg) and OI decreased to 24 within 2 hours during HFOV. Blood flow across AV-ECLA remained at 1.8-2.0 lpm ensuring normocapnia, and the intracranial pressure was never above 17mmHg. FiO_2 was stepwise reduced to 0.4 and the patient could be weaned back to PCV at day 5.

Commentary

The combination of two innovative treatment modalities resulted in rapid stabilization and improvement of gas exchange during severe ARDS refractory to conventional lung protective ventilation. Application of AV-ECLA enables carbon dioxide removal and thereby facilitates protective ventilatory strategies being applied to the patient. With severe hypoxemia, the application of AV-ECLA allows the complimentary use of HFOV for oxygenation with oscillatory frequencies of up to 10-15 Hz, minimizing the risk of baro- and volutrauma.

