

Topic: 4. Respiratory Failure

**Title: Extracorporeal CO<sub>2</sub> Elimination (ECCO<sub>2</sub>R System) to Avoid Invasive Ventilation during Hypercapnic Coma with NIV Failure (Case History)**

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Text:

**Problem Statement:**

Can invasive ventilation be avoided with an ECCO<sub>2</sub>R procedure in acute exacerbated COPD (AECOPD) with hypercapnic coma and only mild hypoxemia during NIV failure?

**Methods:**

The Hemolung<sup>®</sup> RAS from ALung was used as the ECCO<sub>2</sub>R system. The pump-operated gas exchange took place with low veno-venous blood flow via a double-lumen 15.5 French cannula.

**Results:**

During non-invasive ventilation (NIV) for hypercapnic coma, the system was inserted in the left femoral vein without complication. Within the first thirty minutes, the pCO<sub>2</sub> was lowered from 109 to 89 mmHg with an extracorporeal blood flow between 270 and 410 mL/min. Vigilance was significantly improved. Beginning with the fourth hour of therapy, the patient was completely alert and able to communicate with a normal pH. Perioral nutrition was possible without limitation beginning on the first day after admission. During the ECCO<sub>2</sub>R therapy, the NIV was paused already on the day of admission. A mild hypoxemia was compensated for with oxygen at 6 l/min via a nasal cannula. Serious complications did not occur during the therapy. During the course of treatment, a drop in Hb was observed due to the hemolysis. To maintain the Hb value of 10 g/dl generally recommended during extracorporeal procedures, two erythrocyte concentrate units were transfused after 7 days of therapy. During the course of the therapy with ECCO<sub>2</sub>R lasting a total of eight days, reduction of the NIV to use at night was finally possible. This had been his previous ventilation at home since 2012. No pharmacological circulatory support was necessary at any time. No critical illness polyneuropathy occurred. After eight days of ECCO<sub>2</sub>R therapy and an intensive care stay lasting a total of eleven days, the patient was independently mobile and was transferred to a unit with normal care.

**Conclusions:**

For the first time, it could be shown that invasive ventilation can be avoided with an ECCO<sub>2</sub>R system during NIV failure with hypercapnic coma. Communication and cooperation were maintained. Perioral nutrition, early mobilization and active respiratory exercises were facilitated. The procedure was tolerated very well. Studies are needed to do an evidence-based assessment of the ECCO<sub>2</sub>-R procedure with regard to its indications and limitations for AECOPD.