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Title: Extracorporeal CO_2 removal in patients with severe COPD exacerbation failing non invasive ventilation

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Body: BACKGROUND. Noninvasive ventilation (NIV) has a success rate of about 75% during an episode of severe hypercapnic respiratory failure in COPD patients. Recently, a new minimally invasive CO_2 extracorporeal removal device (ECCO2-R, Decap; Hemodec, Salerno, Italy) consisting of a pump-driven veno-venous hemofiltration system has been developed. The main features of this system are a low extracorporeal blood flow (<500 ml/min), using a small (14-French) double-lumen catheter, and a relatively small infusion rate of heparin. METHODS. 15 COPD patients with severe hypercapnic respiratory failure failing NIV after a trial of 2-4 hrs and meeting the criteria for intubation (i.e.pH < 7.30 and hypercapnia (no changes or increased in the PaCO2 baseline values), respiratory rate > 35 b/min, moderate to severe dyspnea) were enrolled. The average duration of treatment with Decap was 18-24 hours. Intubation was required in 2/15 (13%) patients, and other 2 had procedure related complications (i.e bleeding and obstruction of hemofiltration circuit), but did not require intubation. RESULTS. Decap improved gas exchange vs baseline (pH 7.28±0.06, $PaCO_2$ 81±16 mmHg PaO_2/FiO_2 184±79, RR 29±8 b/min baseline; pH 7.34±0.07,$PaCO_2$ 70±19, PaO_2/FiO_2 169±60, RR 22±6 b/min at 1 hour; pH 7.37±0.07, $PaCO_2$ 64±16, PaO_2/FiO_2 210±85 RR 21±6 b/min after 12 hours). CONCLUSIONS: This study shows that extracorporeal CO2 removal may be applied safely with veno-venous technique needing low blood flow and therefore can be used to avoid intubation in those patients failing a NIV attempt.