

Combined use of extracorporeal carbon dioxide removal (ECCO₂-R) and Noninvasive Mechanical Ventilation in hypercapnic acute respiratory failure due to COPD exacerbations in patients at risk of NIMV failure: a rationale of use

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Introduction

Acute respiratory failure in patients with Chronic Obstructive Pulmonary Disease (COPD) is characterized by high levels of hypercapnia. To date, state-of-art treatment includes mechanical ventilation support. Our study was designed from a matched cohort study with historical control conducted by Chandra et al, Del Sorbo et al.^{1,2} in 2014 that provided the rationale to use ECCO₂-R in hypercapnic respiratory failure and respiratory acidosis non responsive at NIV at risk of endotracheal intubation (E.T.I).

Aim

The aims of this study are to evaluate the effectiveness of non-invasive ventilation and extracorporeal carbon dioxide removal in hypercapnic respiratory failure with respiratory acidosis in COPD patients, and to prevent endotracheal intubation and all its potential complications (pneumonia, difficulty weaning, tracheostomy, - prolonged hospitalization).³

Setting: RICU & IICU

Methods

We enrolled 10 consecutive patients admitted at IICUs/RICU, diagnosed with COPD in ARF, age 18-80 y.o.; BMI<35, arterial CO₂ >20% from basal value; arterial pH >7.15 & <7.30; respiratory rate >30 breaths/min, paradoxical abdominal movements. On admission - SOFA, APACHEII & SAPSII scores were captured.

We focused on three primary end points:

1) Reduction of arterial CO₂, increasing of arterial pH and reduction of RR

2) Prevention of endotracheal intubation

3) Providing early support to patient weaning^{4,5}

Results

Eight of ten patients avoided E.T.I. and were easily weaned from NIMV with arterial CO₂ levels returning to basal value after 48h of treatment. One subject was not responsive to NIMV and was treated with invasive ventilation. One subject was removed from treatment for hypersensitivity to heparin and bleeding from arterial catheter.

Conclusion

This study supports the use of non-invasive mechanical ventilation in combination with ECCO₂R in hypercapnic respiratory failure due to COPD.⁶ In addition we suggest assessing the effectiveness of noninvasive ventilation to reduce potential complications and time of hospitalization in this patient population.

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