

POSTER PRESENTATION

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Coagulation disorders in subjects undergoing pump-driven veno-venous ECCO2-r for severe acute hypercapnic respiratory failure - a single center experience

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Introduction

Recent evidence suggests low-flow extracorporeal CO₂ removal (ECCO₂-R) systems as safe and promising adjunctive therapy to avoid endotracheal intubation and the related negative consequences in subjects with severe hypercapnic respiratory failure [1]. In high-flow extracorporeal membrane oxygenation systems heterogeneous coagulation disorders are a well-known complication. However, to date there is little evidence for the influence of pump-driven low-flow veno-venous ECCO₂-R on the coagulation system.

Objectives

This study is a retrospective analysis of four subjects developing coagulation disorders with bleeding complications while undergoing ECCO₂-R.

Methods

Four subjects treated with a pump-driven veno-venous ECCO₂-R (system: iLA Activve[®]; membrane ventilator: Minilung[®]; Novalung GmbH, Talheim, Germany) for severe hypercapnic respiratory failure due to acute exacerbation of COPD were included in this study. Unfractionated heparin was used for anticoagulation with a target aPTT of 45-55 sec. Coagulation parameters i.e. hemoglobin, platelets, fibrinogen, antithrombin and D-DIMER were retrieved from the charts at treatment initiation and during the time range starting 72 hours before and ending at the clinical onset of the bleeding complication.

Results

Mean application time of ECCO₂-R was 196.5 h (± 77.4) with an average blood flow of 1.1 l/min (± 0.2).

Table 1. Coagulation parameters

	baseline*	-72h	-48h	-24h	day of bleeding
hemoglobin (G/l)	114.5 (± 24.3)	97.8 (± 11.8)	88.8 (± 16.9)	79 (± 14.5)	81.8 (± 14.1)
thrombocytes (G/l)	195.5 (± 125.5)	193.3 (± 136.0)	171 (± 122.5)	141.8 (± 122.1)	125.5 (± 100.2)
fibrinogen (mg/dl)	370 (± 97.4)	358.8 (± 133.9)	343.5 (± 136.3)	255.5 (± 136.2)	235.5 (± 142.9)
AT III (%)	101 (± 20.9)	86 (± 25.7)	80.5 (± 21.6)	69.5 (± 23.7)	74 (± 14.5)
D-DIMER (µg/l)	1170 (± 435.4)	5079 (± 6597)	7569 (± 11340)	11048 (± 16140)	12709 (± 15453)
PT (%)	90.8 (± 18.7)	91 (± 19.8)	86.8 (± 18.8)	81.8 (± 16.9)	82.5 (± 24.8)
aPTT (sec)	38.8 (± 12.0)	39.8 (± 10.4)	46.8 (± 11.3)	49.5 (± 15.1)	36.8 (± 7.7)
Heparin (IU/kg/day)	0	207.8 (± 80.5)	259.7 (± 84.3)	150.1 (± 115.7)	78.33 (± 97.1)

Results are presented as mean (± SD).

*baseline refers to the last value before application of ECCO₂-R

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Bleeding events consisted of two pulmonary bleedings, one large soft tissue hematoma and one hemothorax. Coagulation parameters are depicted below in Table 1. ECCO2-R was removed in all subjects after onset of the bleeding complication resulting in stabilization of the coagulation state.

Conclusions

Despite adequate anticoagulation subjects undergoing pump-driven veno-venous ECCO2-R developed coagulation disorders similar to disseminated intravascular coagulation with concomitant bleeding complications. The underlying mechanism remains to be clarified.

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Reference

1. Kluge S, Braune SA, Engel M, Nierhaus A, Frings D, Ebel H, *et al*: Avoiding invasive mechanical ventilation by extracorporeal carbon dioxide removal in patients failing noninvasive ventilation. *Intensive Care Med* 2012, **38**(10):1632-1639.

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