Coupled extracorporeal CO_2 removal and continuous renal replacement therapy for the treatment of multiorgan failure in a pregnant woman with COVID-19: a case report

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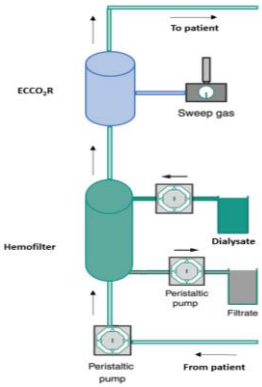
Background

Lung-protective ventilation (LPV) with low tidal volumes (TV) is one of the cornerstones in the treatment of acute respiratory distress syndrome (ARDS), but hypercapnia is a potential complication of LPV. Then, a wide range of extracorporeal CO_2 removal ($ECCO_2R$) techniques have been developed. These treatments may be performed alone or in combination with other organ support therapies.

Case Presentation

A pregnant patient affected by COVID-19 who presented hypercapnia and acute kidney injury. The patient was treated with an $ECCO_2R$ membrane inserted in series after a hemofilter in a common continuous renal replacement therapy (CRRT) platform.
$ECCO_2R$ is a polymethyl pentene, hollow fiber, gas-exchanger membrane of 1.35 m2.
$ECCO_2R$ + CRRT was set in continuous veno-venous hemodialysis (CVVHD) mode.
Systemic anticoagulation was obtained by continuous administration of unfractionated heparin (UFH).
Complications: minor bleeding episodes

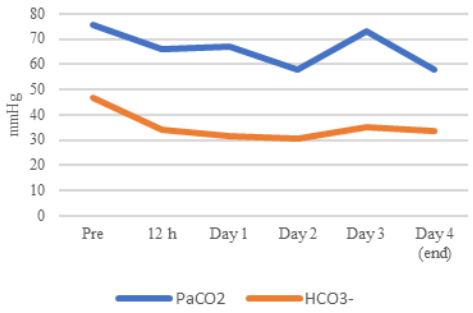


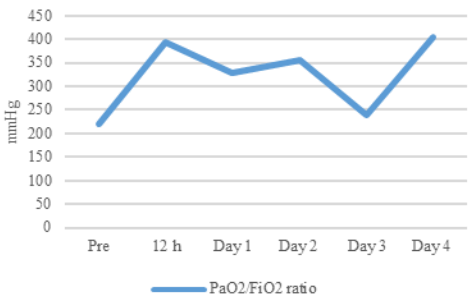
Results

The combined treatment was effective in reducing hypercapnia, allowing the maintenance of LPV. Moreover, it was associated with the hemodynamic stability of both mother and fetus.
After $ECCO_2R$ + CRRT termination, the patient progressively recovered pulmonary and kidney function. Moreover, she underwent a preterm spontaneous vaginal delivery of an alive baby.

LPV

	Pre	12 h	Day 1	Day 2	Day 3	Day 4 (End)
Blood flow, ml/min	-	300	300	300	300	300
Sweep gas flow, l/min	-	5	5	5	3	4.5
Vt, ml/PBW	4.3	2.5	3.5	4	3.6	5.1
RR, breaths/min	35	26	26	26	26	26
Pplat, cmH20	32	30	30	30	30	30
PEEP, cmH2O	12	12	14	12	12	12
pH	7.39	7.32	7.29	7.32	7.33	7.36





Conclusions

Our case supports the use of $ECCO_2R$ + CRRT as a suitable approach in complex patients, including those with severe COVID-19, being aware of the potential complications linked to this treatment.