

Combined application of CytoSorb and CRRT in a patient with acute renal failure and septic shock as a consequence of lower respiratory tract infection

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This case reports on a 57-year-old female patient, who was transferred from a peripheral hospital to the emergency department of Max Super Specialty Hospital, Shalimar Bagh, with complaints of abdominal pain, breathlessness and fever over the previous 2 days.

Case presentation:

- Known medical history included diabetes mellitus, hypertension and osteoarthritis
- On admission, her heart rate was 116/min with a blood pressure of 133/81 mmHg
- Due to respiratory distress, the patient was intubated and mechanically ventilated. Oxygen saturation was 91% on the ventilator (FiO₂ 60 %, PEEP 8 mmHg)
- Her APACHE II score was 33
- Arterial blood gas analysis revealed severe metabolic acidosis (pH 6.89, lactate 12.7 mmol/l, pCO₂ 42.3 mmHg, pO₂ 81.3 mmHg, HCO₃⁻ 9.6 mmol/l, FiO₂ 1.0 mmHg)
- Chest X-ray exhibited bilateral non homogeneous opacity (RT>>LT) while the ECG showed sinus tachycardia
- The patient showed elevated markers of inflammation/infection (leucocyte count 42,500/μl, procalcitonin (PCT)> 100 ng/ml), indicative of an ongoing systemic hyper inflammatory response to an infectious origin
- Additionally, laboratory diagnosis showed increased serum creatinine levels (3.38 mg/dl) with minimal urine output
- Analysis of endotracheal secretions showed Klebsiella spp. and Candida tropicalis resulting in the working diagnosis of septic shock as a consequence of lower respiratory tract infection
- She was started on broad-spectrum antibiotic therapy using meropenem and teicoplanin, and fluid resuscitation was initiated
- Antibiotic therapy was supplemented with administration of hydrocortisone in the context of septic shock
- After transfer to the medical intensive care unit, she had a further drop in blood pressure followed by initiation of norepinephrine, epinephrine and vasopressin infusions for hemodynamic support
- Bedside echocardiography was without pathological findings
- Due to persistent lactic acidosis, severe hemodynamic instability with high catecholamine and vasopressin requirements, as well as development of anuric acute renal failure, a right femoral hemodialysis catheter was inserted followed by initiation of combined Continuous Renal Replacement Therapy (CRRT) with CytoSorb therapy

Treatment

- One CytoSorb session was performed for 24 hours along with CRRT
- The adsorber was used in conjunction with CRRT (Multifiltrate, Fresenius Medical Care) and run in CVVHD mode
- Blood flow: 100 – 150 ml/min
- Anticoagulation: heparin (500 IU/hr decreased to 100 IU/hr due to high aPTT)
- CytoSorb adsorber position: pre-dialyzer

Measurements

- Hemodynamics and requirement for catecholamines and vasopressin
- Inflammatory status
- Markers of organ dysfunction
- Metabolic status
- Overall clinical status

Results

- Hemodynamic stabilization with a significant improvement in mean arterial pressure and heart rate was noted as a result of the treatment, accompanied by a decrease in norepinephrine, epinephrine and vasopressin requirements. Catecholamine and vasopressin support could be completely weaned off on the 3rd day
- During the course of treatment, leucocyte count decreased to 18,000/ μ l and PCT levels decreased to 4 ng/ml
- Furthermore, combined application of CytoSorb and CRRT resulted in a decrease in creatinine levels to 1.8 mg/dl and of bilirubin from 1.8 to 1.1 mg/dl
- Metabolic acidosis also improved as indicated by a clear decrease in plasma lactate levels
- The patient showed a clear improvement in her general clinical condition during and after combined CRRT and CytoSorb treatment

Patient Follow-Up

- Following the 1st CytoSorb treatment, the patient could be gradually weaned off the ventilator and was extubated 4 days after admission
- After cessation of CytoSorb therapy she was put on sustained low efficiency dialysis (SLED) which, after stabilization and extubation, was switched to hemodialysis for treatment of her renal failure
- She was discharged after a total of 7 days to the peripheral hospital for further dialysis care

Conclusions

- In this patient diagnosed with acute renal failure and septic shock as a consequence of lower respiratory tract infection, the combined use of standard of care and CytoSorb with CRRT proved to be very efficient in stabilizing the hemodynamic, inflammatory and metabolic situation and led to a clear improvement in the patients' general clinical condition
- This case highlights the importance of using CytoSorb at the right time, where the correct use of CytoSorb therapy helped regain control in the acute phase of the patient's condition and lead to survival of the patient
- Application of CytoSorb was safe and without any side effects