

# Extracorporeal blood purification with Cytosorb® in pediatric refractory septic shock: does it make the difference?

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## Background

Severe sepsis and septic shock are the most common causes of pediatric death in the world. The combination of different extracorporeal blood purification (EBP) techniques has been suggested as a potentially effective approach in the management of septic shock.

## Methods

We present a case of a 8-year-old patient affected by acute lymphatic leukemia and treated with recent chemotherapy, admitted to our Pediatric Intensive Care Unit (PICU) for severe refractory septic shock correlated to *Clostridium difficile* infection.

## Results

While in Hematology ward, the patient developed severe neutropenia and fever. Empiric broad spectrum antimicrobial and antifungal therapy - with vancomycin, meropenem, metronidazole and micafungin - was started. Nevertheless, a progressive deterioration of general conditions occurred, rapidly leading to severe septic shock. Then, the patient was transferred to our PICU for intensive treatment.

At admission, he presented extreme and persistent hypotension, with mean arterial pressure (MAP) below 40 mmHg, and severe metabolic acidosis with hyperlactacidemia (arterial lactate levels of 160 mg/dl). He underwent orotracheal intubation, mechanical ventilation and cardiocirculatory support.

Despite important fluid resuscitation (>20 ml/kg), inotropic therapy (epinephrine 0.2 µg/kg/min) and hydrocortisone administration (1 mg/kg x 4), the clinical condition did not improve.

Even in absence of acute kidney injury, continuous renal replacement therapy (CRRT) was started, in order to counteract the severe metabolic acidosis and fluid overload, due to capillary leakage, and remove sepsis cytokines. Continuous veno-venous hemodiafiltration (CVVHDF) modality, with a high effluent dose of 60 ml/kg/h, combining a ST60 filter with Cytosorb® cartridge column, was chosen.

After 48 hours from the beginning of this EBP strategy, a significant reduction in inotropic drug doses (epinephrine from 0.2 to 0.04 µg/kg/min), lactates (from 160 to 12 mg/dl), CRP (from 22 to 3.5 mg/dl) and procalcitonin (from 8 to 1.5 ng/ml) levels was observed.

CRRT was continued for the first 72 hours without complications. Finally, the patient was successfully discharged from PICU after 9 days.

## Conclusion

Cytosorb® is a cartridge column with a wide surface area which can directly adsorb and clear sepsis mediators. The combination of CRRT and Cytosorb® has a relevant synergistic effect also in pediatric septic shock, helping in the management of cardiocirculatory shock, metabolic acidosis, fluid overload and immuno-modulation.